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## ORIGINAL ARTICLES

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### A CONSIDERATION OF LOCK SPRINGS FOR LINGUAL APPLIANCES\*

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SOME years ago, Dr. Mershon gave to the profession the use of his lingual appliance. He was using, at that time, a modification of a lock which was known to the profession as the Young-Angle lock, which had been used on the "pin and tube appliance." This lock consisted of a half round tube soldered perpendicularly to the band. The tube was soldered near the gingiva on the lingual surface midway between the mesio- and distolingual angles. The length of the tube, which varied but eight one-hundredths of an inch, was found to be the most desirable.<sup>1</sup> The lock spring consisted of a piece of wire which was originally soldered to the distal end of the appliance and then bent around under the gingival edge of the tube. This plan of construction was changed to soldering the locking spring anteriorly to the spur which engaged the tube (Fig. 1). One of the reasons given for having this locking spring anterior to the tube was that the end of the spring did not catch the tongue so readily, as the tongue seems more liable to injury during the posterior movement than when moved anteriorly.

One of the objections to this type of lock and locking spring is the difficulty of inserting the pin in the tube as the locking spring interferes with insertion. The tube was sometimes made from material too soft which allowed it to stretch, thereby allowing considerable occlusogingival play in the incisal region. In order to eliminate the play, some men soldered two tubes on the lingual surface of the band, thereby making "double attachment," which increased the stability of the appliance to a certain degree but also increased the difficulty of construction. The tendency for the appliance to move occlusogingivally was prevented only by the friction or binding of the

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\*Read before the Southwestern Society of Orthodontists, Tulsa, Oklahoma, April, 1925.

half round or round tubes, plus the small amount of resistance given by the lingual locking spring.

If the locking spring engaged the anterior tube when two tubes were used, the appliance was quite stable, but if the locking spring engaged the posterior tube by being soldered to the posterior end of the wire, very little stability was gained. A more careful analysis of these facts will be made in the latter part of this paper.

However, the fact seems to be apparent that the rigidity of the lingual appliance would be greatly increased with the use of the lock, which would increase the surface bearing between the two parts and be made of a material sufficiently strong and heavy to prevent bending.

As a result of this idea there came into use two locks which, from a standpoint of rigidity, have not been surpassed up to the present time. One was known as the Porter lock,<sup>2</sup> which consists of a rectangular lug soldered to the lingual surface of the band which slips through a rectangular tube. This is held in place by a locking spring which fits into a concave groove.

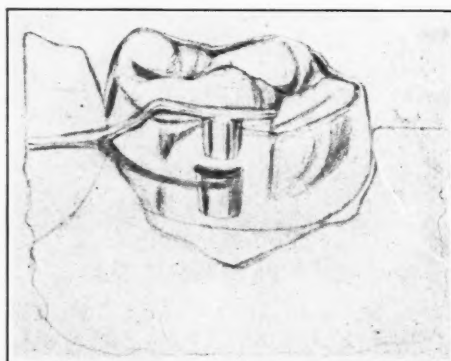


Fig. 1. (Mershon.)

The advantages of this lock are the square corners of the part engaged, the amount of surface contact anteroposteriorly, and the locking spring fitting in a groove which prevents the rectangular tube from slipping off the rectangular lug. This lock was very satisfactory and was used by me almost exclusively for a number of years. During the last few years it has not been used so much, not because of any defect in the lock, but because a concern which had no part in the origination of the lock or in its manufacture, has taken out a patent on the lock and has notified the original manufacturer that he cannot make Porter locks without paying a royalty to the manufacturer who has obtained the patent. The concern holding the patent has never manufactured the lock, and it is our belief that the patent was only obtained to embarrass the profession and discourage the use of the lock so the patenting concern could sell a greater number of another appliance which they also hold a patent on. The second locks, which possess a great amount of rigidity and which are very satisfactory, can be manufactured or made by the orthodontist without being subjected to the royalties of a manufacturer. This lock was introduced by Dr. Johnson.<sup>3</sup> The principle is very similar to the Porter lock and consists of soldering a piece of triangular wire

(Fig. 3) to the lingual surface of the band. The other part of the lock is made of a heavy piece of material which slips over that portion soldered to the band and is held in place by the locking pin which fits into a hole drilled through the two parts.<sup>4</sup> This lock is made by taking a piece of the triangular wire, investing it in wax, removing the wire from the wax and then investing the wax and casting, as described in Dr. Johnson's original article. Owing to the fact that the writer never had any experience in casting, he has never used Johnson's lock, but to those who have had experience in casting, the Johnson lock possesses great possibilities.

From the original idea of the Young-Angle lock many different types of lingual locks have been produced. A particularly interesting lock was that made by Dr. Bach,<sup>5</sup> who conceived the idea of using a "catch" on locking lugs to engage the locking spring. In some of his locks, as shown in Fig. 4, it will be seen that the locking spring occupies a position occlusally to the

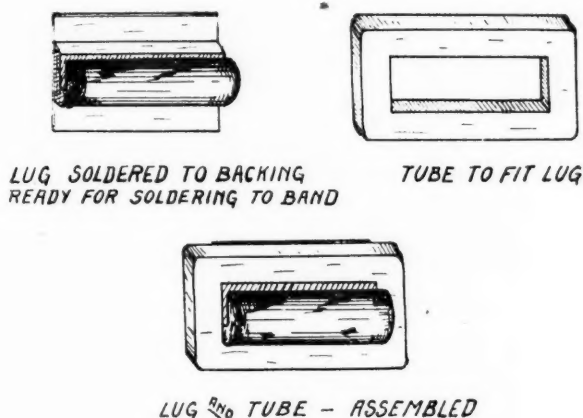


Fig. 2. (Porter.)

body wire, which is a disadvantage because mastication tends to unlock the spring.

Dr. Howe also showed a lock similar to the Bach lock, in a clinic which he gave in 1921, in which he was using a locking lug. The lock has several good features, especially as regards the shape of the locking lug. (Fig. 5.)

In July, 1924, Dr. Hamilton prepared an article, which was published in the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, calling attention to some of the difficulties found in the locks. I believe it would be wise to quote from Dr. Hamilton's paper at this time, as he outlines some of the difficulties encountered in the lingual locks, and some of the advantages obtained from the Bach lock.

"At the meeting of the Alumni Society of the Dewey School of Orthodontia held in Chicago, March, 1917, Dr. Mershon described his lingual appliance. On my return home, an attempt to make such an appliance, with such materials that were at hand, proved not entirely satisfactory, because the materials were not really suitable.

"After again hearing Dr. Mershon, at the meeting of the American Society of Orthodontists in Chicago, August, 1918, my second attempt was made,

but desiring to obtain as great a rigidity as possible in the attachment, which was not satisfactory in my first attempts, an oblong pin and tube were used instead of the half-round tube usually used.

"More or less difficulty was experienced in the use of the lock-wire soldered anterior to the pin. A spring wire was difficult to lock in place and stay there, and a soft wire lacked in rigidity, but the greatest difficulty was the tendency to impinge on the gum. The lock-wire soldered to the distal end of the main wire also tended to impinge on the gum. To get the lock-wire of either type under the end of the tube was often difficult, because it had to be sprung away from the main wire in order to get the pin in the tube, and then back again under the end of the tube to lock. Both forms were troublesome on the lower jaw and especially so in young patients.

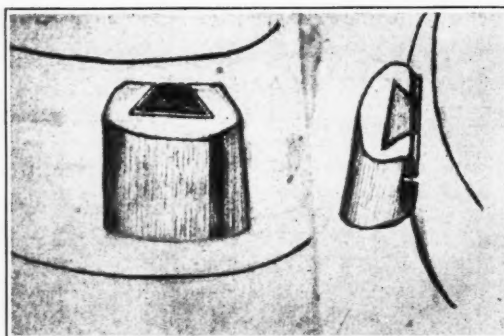


Fig. 3. (Johnson.)

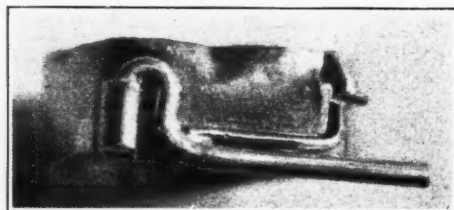


Fig. 4. (Bach.)

"With the short molars of the young patient, it was found difficult to use a tube long enough to get a stable rigid attachment and almost impossible to get the lock-wire under the end of the tube without encroaching on the gum.

"Attempting to avoid this difficulty, a lug was soldered on the band a little anterior to the tube. A recurved wire was soldered to the main wire and locked under the lug. (Fig. 6.) This lock-wire made the inserting of the appliance very easy as it did not interfere in any way but slipped over the beveled lug and snapped into place. This lock-wire added to the rigidity of the appliance anteriorly. It added a little to the bulk and unless carefully constructed was likely to hold food particles in the embrasure.

"To obviate that danger the lug was soldered on the tube and the lock-wire soldered to the posterior end of the main wire. (Fig. 7.) This oblong pin and tube form of attachment is very rigid, and the molar can be rotated or tipped at will.

"The oblong pin is  $14 \times 21$  gauge and fits the tube very snugly. Both are platinum-gold. The tube is soldered close to the lower edge of the band and the lower end beveled with a slight concave toward the band, so the tube can come close to the gingival margin and fit over it. This permits the longest possible tube and pin and gives the greatest stability.

"The end of the pin is shaped exactly as the lower end of the tube and exactly the same length when seated. To add to the strength of the soldered joint of the pin, to the main wire in the end of the pin a slight concave groove is cut the long way, making a closer fit to the round wire. A thin carborundum separating disk is used.

"The main wire is Aderer's No. 4. Noxidium E. 22-gauge wire has proved the most satisfactory in my hands for the lock-wire. It is soft enough to be readily forced into place and stay put, and at the same time has a slight stiffness or spring to hold tightly.

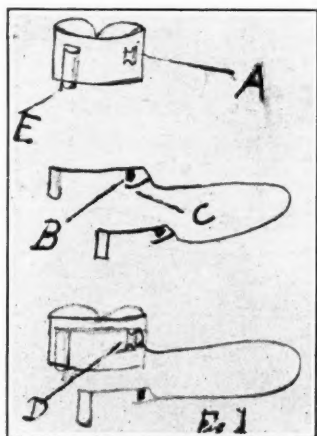


Fig. 5. (Howe.)

"Trouble is occasionally experienced by the breaking of the main wire immediately anterior to the tube. Attempting to obviate this, a round tube as long as the gum would permit and slightly flattened on the side to be soldered, was soldered at the posterior corner of the band. Another piece of tubing was similarly soldered at the anterior corner with the upper end at the same height as the posterior tube, but with the lower end as far from the gum as possible. The end of the main wire is bent at a right angle to form the pin, and the wire is formed to the contour of the tooth and rests on the top of the anterior tube which is slightly concaved, giving stability to the appliance. The lock-wire, in the form of a recurved spring, is soldered to the wire just posterior to the anterior tube. (Fig. 8.) Or it may be soldered to the main wire just anterior to the posterior tube and bent forward at a right angle snapped under the anterior tube. The recurved lock-wire seems to give a little more rigidity to the appliance than the other types."

It will be noted that the lock shown by Dr. Hamilton in Fig. 8 is very similar to the one shown by Dr. Howe in Fig. 5, in that both have employed two tubes. Dr. Howe used a small lug in the anterior tube, while Dr. Hamilton used a longer recurved locking spring without the lug.

After editing Dr. Hamilton's article and having had experience with almost every type of lock used and being opposed to the paying of royalties to a manufacturer who had not invented or discovered the Porter lock, I recognized the possibility as shown in Fig. 8. We then began using a modified lock very similar to those shown by Drs. Howe and Hamilton and subjected it to the most severe tests in use in our private practice and also on the clinic patients. The analysis of the lock appliance as shown in Fig. 8 has the following advantages: It employs a round tube, which means it can be more easily adjusted than the square or rectangular tube. This round tube can be made from an ordinary piece of round tube cut in lengths desired. In our use ten one-hundredths of an inch seems to be the most universal. The tube can be made by having the manufacturer cut them into lengths of ten

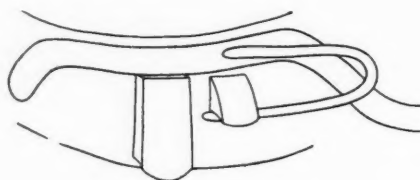


Fig. 6. (Hamilton.)

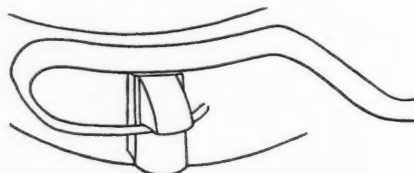


Fig. 7. (Hamilton.)

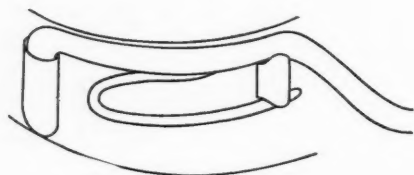


Fig. 8. (Hamilton.)

one-hundredths of an inch. We have called your attention to the fact that the original Young-Angle lock as first used, and the Mershon lock had the tube placed on the lingual side of the band midway between the mesial and distal lingual surface. Fig. 8, as described by Dr. Hamilton, and Fig. 5, taken from Dr. Howe's article, show the tube placed at the distal third of the lingual surface; it should be remembered that some method must be used to prevent a molar from rotating, for in expanding, a greater amount of pressure would fall on the distal portion of the tooth, thereby rotating the distal part of the tooth buccally. This rotation is prevented by the anterior tube used by Dr. Howe and the anterior lug (Fig. 5), and can also be controlled by shape of the lingual lug and the shape and adjustment of the locking spring as used by Howe and Hamilton.

It will be noticed by reading Dr. Bach's original article that he called attention to the possibility of controlling the use of the molar by using the

locking spring. He also recognized the locking springs had a bearing upon the stability of the appliance. The shape of the locking spring as a means of giving stability to the appliance, as mentioned by Dr. Hamilton in his description of Fig. 8, will be better understood by studying the illustration. It will be noticed that Howe and Hamilton have a notch or groove in the locking lug so as to receive the end of the locking spring. A cross section view of the locking spring, the band and the locking lug is shown in Fig. 9. This locking lug can be made from a piece of round wire, the end having been beveled so as to make the desired concavity; it can also be made from a rectangular piece of metal in which a groove has been cut out to receive the locking spring as shown in Fig. 9. The advantages of using a rectangular piece of metal are that it gives a greater bearing surface to the tongue and the lug does not present as sharp an edge as the locking lug made from a round wire.

The shape and position of the locking spur or lug has a definite influence on the stability of the lingual appliance. By analysis of lingual appliances, we find there is a tendency for the body-wire to move occlusally and the tube becomes the point of rotation. The least amount of play between the

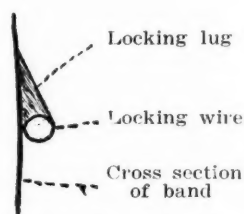


Fig. 9.

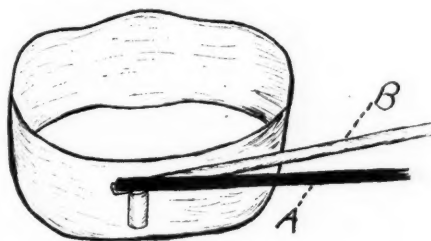


Fig. 10.—A, Proper position of lingual wire; B, displacement of wire when there is "play" in tube.

tube and the spur in the molar region will produce considerable movement (Fig. 10). It therefore follows that any form of construction that can be made in the anterior region of the appliance to prevent it from moving would be an advantage. This adjustment can be obtained in two ways as is shown by Dr. Hamilton in Fig. 2, and Dr. Howe in Fig. 5, and consists of soldering the lingual locking lug as far anterior as possible on the molar band and in soldering the locking spring as far forward as possible. In following out the first plan, we place the locking lug as far anteriorly on the lingual surface on the molar band as possible and the tube should be placed as far posteriorly as possible. The locking spring and lug must be placed as far forward as is possible so as to make the lingual appliance rigid. Fig. 11 shows the position of the tube and locking lug; by placing the locking spring anterior to the lug greater stability is obtained. The locking spring shall be so adjusted that it makes an occlusal pressure on the lug as shown in Fig. 12. If the tube was placed on the first molar band and the lingual lug on a band on the first or second premolar, the appliance would be more stable but the anchor teeth would be tipped unless the bands were soldered together.

We have already called attention to the shape of the lingual lug which receives the locking spring. The gingival portion of the lingual lug does not come near the soft tissue because it should never be more than five one-hundredths of an inch in length. The occlusal portion of the lingual lug should touch the body-wire but it must be slightly beveled in order to allow the locking spring to slide into position. The reason for having the lug in contact with the body-wire, as has been mentioned by Dr. Hamilton, is to prevent the tendency of the locking spring to raise the mesial surface of the molar, because the locking spring must be so attached as to push occlusally on the lingual lug. We have mentioned the fact that the rigidity of the appliance will be increased by placing the locking spring as far forward as possible on the body-wire. However, when using recurved finger springs similar to those used by Dr. Mershon, the position of the locking spring soldered to the body-wire must be carefully judged in order to avoid the interference with the recurved finger spring in the premolar region. It is generally necessary to solder the locking spring opposite the lingual

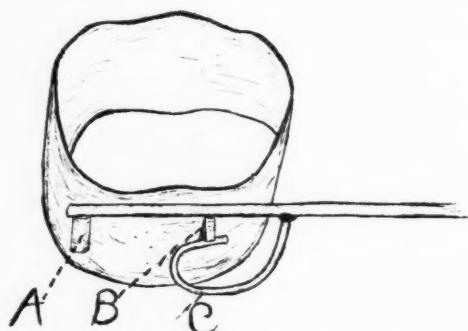


Fig. 11.—A, 18 gauge tube; B, locking lug; C, locking spring.

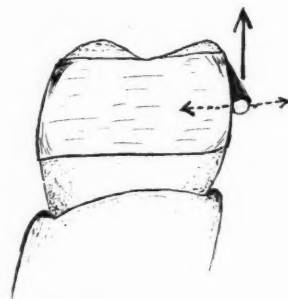


Fig. 12.—Heavy arrow shows direction of pressure from spring against lug. If pressure from the spring is in the direction of the light arrows the tooth will move either buccally or lingually depending upon the direction of force.

proximal embrasure between the first molar and the second premolar. Locking springs must be shaped so as to allow the food to slide over the gingiva. By soldering the spring as far forward as possible and recurving it as shown in Fig. 11, elasticity is obtained to allow the lingual wire to be removed from the slot or groove of the gingival portion of the lingual lug without destroying the elasticity. Dr. Hamilton recommends twenty-two gauge which should be .025 wire used for the locking spring. We have used .025 wire in some instances instead of the .020 as .025 makes a much more rigid lock which also is much more difficult to manipulate because of the increased rigidity. The lingual locking spring must be made from a dependable spring material; Dr. Hamilton recommends No. 4 Aderer's Noxidium. While in our practice we use "Ever-Spring" wire as made by Baker and Company, a soft wire is absolutely useless for a locking spring.

If the locking spring is active buccally, the tooth will be rotated. If a round tube is used and the molar is in torsion, the locking spring can be used to correct the malposition of the molar.

By careful consideration of the locking spring and lug it will be found that this lock eliminates some of the difficulties which arise from lingual appliances.

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## THE IMPORTANCE OF PROPER GINGIVAL RESTORATION IN ORTHODONTIC TREATMENT

BY A. WOLFSON, D.D.S., EAST ORANGE, N. J.

THE accompanying illustrations are from radiograms taken during the re-treating of an interesting case. The patient, a young lady of sixteen, received orthodontic treatment several months prior to coming to my office. According to her history, the mandibular left second premolar was stunted in growth and rotated. When the orthodontist who treated her had placed all the other teeth in their proper places in their arches, he found it impossible to handle this particular tooth because of its lack of proper anteroposte-



Fig. 1.

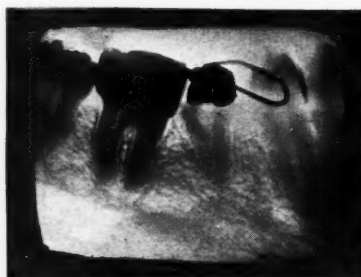


Fig. 2.



Fig. 3.



Fig. 4.

rior dimensions. He therefore asked the patient to go back to the general practitioner who referred the case and have him put on a crown with a view to maintaining the proper anteroposterior dimensions. The family dentist in this case refused to have anything to do with this problem because, as he claimed, it was purely an orthodontic case. The patient came back to the orthodontist with this story and so the orthodontist undertook the restoration himself.

Fig. 1 illustrates this restoration when the patient presented herself at my office. As is evident, no crown could have been placed that could adequately fit the tooth at the gingival portion and the family dentist, whether

intuitively or accidentally, saved himself responsibility for the poor restoration shown by refusing to handle the case.

*Treatment.*—I removed the gold crown and found it more than two-thirds full of cement and the tooth under it perfectly normal and vital. I made a casting to fit over the stump of the crown and cut a notch on the posterior aspect. A band was fitted to the molar and a recurved finger spring attached. The end of the spring was pulled slightly back and made to engage in the notch of the casting. (Fig. 2.) In approximately four months, under constant gentle spring pressure, this premolar was moved forward sufficiently to make it possible to restore the crown anatomically. Fig. 3 shows the change in the position of the root, and Fig. 4 shows the crown restored with a porcelain jacket crown; the tooth remained normal and vital throughout the treatment. I consider this case sufficiently of interest because of the fact that it brings out the possibility of orthodontists' narrowing their vision to occlusion and contact points so much as to overlook the importance of true anatomic restoration at the gingival as well as elsewhere.

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## MALOCCLUSION OF THE TEETH REGARDED AS A PROBLEM IN CONNECTION WITH THE APICAL BASE\*

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BY AXEL F. LUNDSTRÖM, STOCKHOLM, SWEDEN

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(Continued from August.)

### A. Local-dental Momenta of Malocclusion

A normal preliminary stage of development of a dental arch of a normal full-grown person has according to Barnes<sup>11</sup> occurred, when the width of the temporary laterals and cuspids plus their distal growth spaces at four to five years of age has been larger than the width of the succeeding corresponding permanent teeth, and when the width of the temporary central incisors plus their growth spaces at seven to eight years exceeds the width of their permanent successors. Even if this statement should in some detail be found not to be of universal application, cases do evidently occur, where the normal growth of the apical base is accompanied by a similar growth of spaces in the temporary denture. Individuals in whom such signs of development are noticeable apparently possess one of the characteristics necessary to allow the permanent dental arches to obtain normal apical bases.

But in such an individual the permanent teeth may be prevented from occupying their normal positions, because of dislocations in the same arch or because the occlusion of the antagonizing teeth is to some extent abnormal. Deviations from normal occlusion may also be effected through a variety of other accidental factors, as abnormal muscular pressure, enlargement of the tongue, loss of the same (McEwen),<sup>58</sup> external force. We will omit them here as they can hardly be characterized as dental.

The local-dental momenta of malocclusion, that are to be described in this connection, are the following:

1. Local crowding of the upper or lower arch.
2. Deficient anteroposterior development of the lower apical base.
3. Distocclusion.
4. Occlusal contraction of the upper arch.

The loss of temporary and permanent teeth has been observed to exert a more or less profound effect on the position of the remaining teeth of a denture. The almost countless combinations that may occur, and that are dependent upon which teeth have been lost and at what age they have been lost, have as yet not been the object of systematic investigation and illustration. A considerable number of these cases properly belong to the scope of the art of Prosthetic Dentistry. But not even this branch of dental art has any standardized and generally accepted plan for the treatment of dentures with a low masticating efficiency as a result of a more or less extensive loss of teeth. Although Prosthetic Dentistry is one of the most ancient branches of dentistry, we have as yet no established plan of treatment for other than the most simple cases, nor any reliable prognosis concerning the various methods employed. We shall accordingly limit our discussion to those anomalies of position, which we can treat without concerning ourselves about the difficult problem of inserting artificial substitutes for missing teeth.

The momenta of malocclusion, which in accordance with this limitation will be of interest to us, are local crowding of the upper or lower dental arch and deficient anteroposterior development of the lower apical base.

1. *Local crowding of the upper or lower arch.*—The early loss of temporary teeth is under certain circumstances followed by insufficient space for the succeeding permanent teeth. But this rule is not applicable to the premature loss of all temporary teeth. It is well known that the early loss of premolars and cuspids may result in a dislocation of the first molar in a forward direction, followed by an insufficient space for the permanent premolars and cuspids.

In the year 1905 Angle advanced his theory, which later was so vehemently attacked, of the uniform position of the upper first molars, according to which theory these teeth are to be considered as reliable "keys to occlusion." But this theory was in substance given up in the second German edition of his textbook.<sup>6</sup> In the chapter on "Diagnostik," written by Grünberg, this latter author admits that the upper first molar may have undergone a mesial displacement as a result of premature loss of temporary teeth. But authors disagree concerning the question, whether a similar displacement of the upper first molar is possible when the temporary arch is intact, and whether it is possible or not for a local displacement to result in an abnormally anterior position of the entire upper arch. These two questions are of primary importance. The answer to the former we shall postpone for the present.

As regards the latter it was Case's opinion that such a condition is possible, and he stated that cases of his "Full Upper Protrusion" may be caused by a similar local disturbance. This assumption seems to me difficult to prove. Even if the forward movement of the buccal teeth could displace the cuspids in the

same direction a thing which is in itself highly improbable, it would present great difficulties to presume that the same pressure would be able to move the incisors forward without the latter changing their mutual relations.

The local crowding we have thus far discussed is caused by an abnormal forward movement of molars. Grünberg<sup>6</sup> has demonstrated that a similar crowding can be caused by incisors drifting backwards, resulting in an insufficient space between the lateral and the first premolar. It seems that it would often be very difficult to determine whether in such a case the crowding in the cuspid region is caused by a premature loss of temporary teeth or by a deficiency in the apical base that is especially noticeable in the region in question owing to a certain amount of displacement. In the latter case the cause of the crowding is not a local momentum of malocclusion.

As distinct from the conditions in the upper jaw the early loss of temporary teeth in the lower jaw has two very different results. One of these is similar to the result of the loss of the corresponding teeth in the upper jaw. But under certain conditions the loss of temporary teeth in the lower jaw has

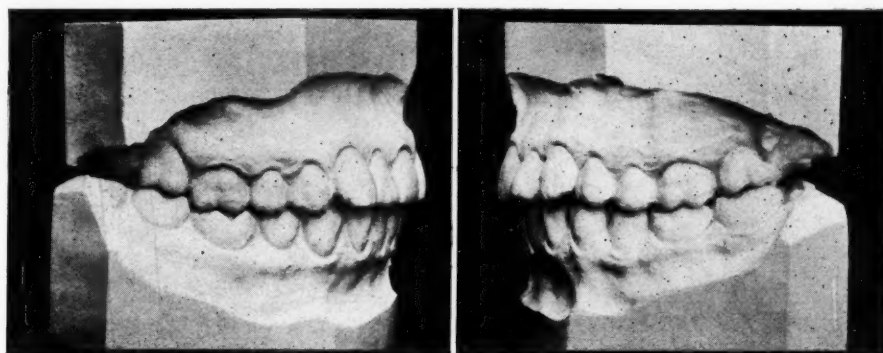


Fig. 20.

Fig. 21.

the effect of stunting the growth of the apical base. In both these very different varieties of local disturbances the cause is dental, that is to say, the disturbance is the result of a factor operating directly on the teeth. Examples of local crowding are illustrated in Figs. 12 and 16 (both jaws), 18 and 19 (upper jaw) and Fig. 28 (lower jaw).

2. *Deficient anteroposterior development of the lower apical base.*—The experiment of Humphries<sup>95</sup> demonstrated that the longitudinal growth of the mandible is effected through absorption at the anterior and apposition at the posterior margin of the ramus ascendens. The early loss of the first permanent molars has been shown to arrest the development of the apical base. Angle<sup>5</sup> has published a case where this has happened (l. c. Fig. 75). In view of this fact it would seem probable that the early loss of the second temporary premolar may also result in a similar condition. To produce evidence of this is, indeed, not very easy, if definite data on a case of this nature are lacking.

If we fail to produce such evidence we may easily make mistakes. In the case Fig. 22 the second premolars of the lower jaw are missing. The teeth behind these are in normal mesiodistal relation to the antagonizing teeth, the anterior teeth are in posterooclusion. The anomaly may have developed through

the extraction of the second temporary premolars, with the result that the anterior part of the arch has, so to speak, got left behind. But it is also conceivable that a distoclusion of the whole of the lower arch has existed, and that the loss of teeth has made possible a mesial drifting of the molars to a normal position in relation to their antagonists. What in this case makes the former possibility probable is the formation of spaces in the lower arch (Fig. 23) and also the height of the overbite.

Grünberg<sup>6</sup> has illustrated lower dentures where the symmetry is ruined by the loss of temporary teeth (see his Fig. 75 l. c.). A similar case is shown in Fig. 16. The normal apical curve of the right side makes it probable that a contraction of the apical base has not taken place, wherefore the crowding of the left side is to be regarded as a local phenomenon brought about by dental disturbance.

If in an otherwise normal lower jaw the first molars are lost at a sufficiently early stage of development, an extensive formation of spaces may occur in the

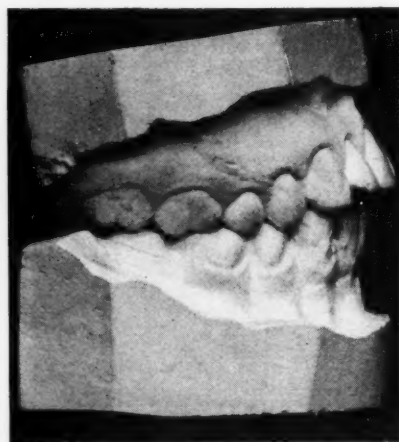


Fig. 22.

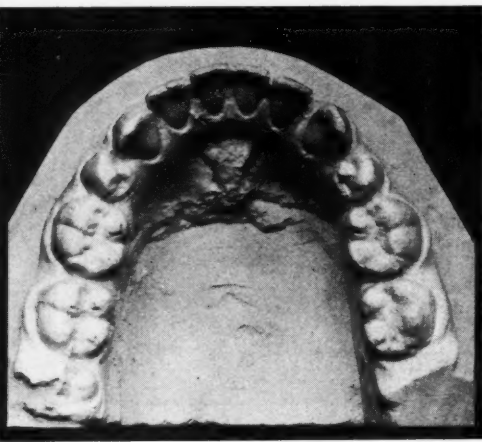


Fig. 23.

anterior part (Fig. 24). If on the other hand the second temporary premolars have been lost early the final result may be what may best be described as if a section of both sides becomes removed and the anterior part of the apical base of the under jaw will have moved equally far back (Fig. 25). The loss of these teeth took place at about the 8th year. In Fig. 28 the second temporary premolar on the lower left side was lost, with the result that a forward drift of the left lower first molar took place, with a consequent lack of space for the second premolar, but no other disturbance in the occlusion. In Figs. 26 and 27 the same tooth was lost on either side before the eighth year, but this was not followed by any displacement. The explanation may be found in the occlusion against the upper second temporary premolar, which acted as a space retainer. If this explanation is correct such a retainer would have prevented the forward drift in the case shown in Fig. 28, and the loss of the left lower temporary premolar would have been without any influence on the development along normal lines, so that a retainer would have been unnecessary. If on the other hand the occlusion is not of this kind, a retainer would have been desirable.

Even if we assume in the case of Fig. 25 a forward drift of the lower molar, which in that case is presumed to have been in distocclusion, we cannot help observing a dissimilar development of the part in front of the space as opposed to what took place in Fig. 28. For the first premolar is far too distal in relation to the cuspid, or more correctly, has failed to accompany it in its forward drift. We may be justified, therefore, in taking into account the possibility that a sufficiently early loss of a temporary second lower premolar may have an influence on the development of the apical base of the lower jaw analogous to what takes place in the case of the corresponding loss of the first molar.

As is well known, Angle has advanced the theory that the anteroposterior development of the lower jaw is stimulated by the wedge-like action of the molar, while erupting between the arch and the ramus ascendens. Having Humphries' experiments in mind we must regard such an explanation as wrong, and consequently the use of a space retainer in such a case as Fig. 25 cannot have the desired result. No evidence of its effectiveness in such cases has ever been published.

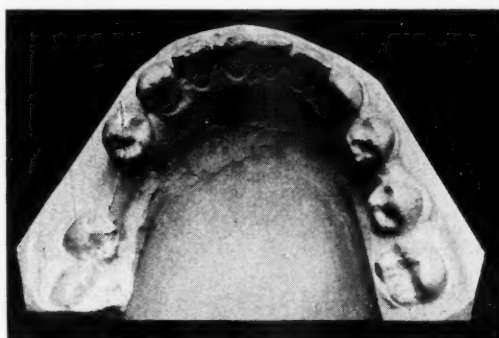


Fig. 24.

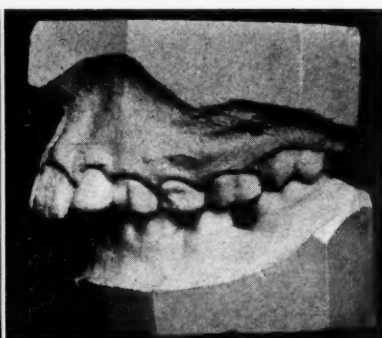


Fig. 25.

The early loss of the second lower temporary premolar may result in three different possibilities: (1) No displacement. (2) Local forward drift to the molars. (3) Deficient anteroposterior development of the apical base of the lower jaw. As the loss of such a large tooth can produce such different effects it would seem justified to draw the conclusion that it is the point of time at which or the manner in which the loss takes place that, apart from the occlusion, is the deciding factor as to whether an occlusional disturbance is taking place, and if so as to its character. We are able to prove that there is a vast difference between the reaction of the apical bases of the upper and lower jaws to the early loss of temporary teeth. In the upper jaw the disturbance is more limited to a dental deviation, whereas in the lower jaw, under certain circumstances, which are not yet clearly defined, but which appear to be in connection with the point of time at which the loss occurs, the apical base itself is retarded in its growth. But even though the difference is great, and even if the deviation in the upper jaw is to a large extent dental, one cannot deny the possibility of an effect upon the apical base itself in that case also, although it is of a considerably less radical nature than can be the case with the lower jaw.

There are authorities, however, who dispute the idea that the presence of

the temporary teeth is essential for the development of the lower jaw to a size sufficient to allow room for the permanent teeth in the normal position. Thus J. Tomes declares that he has removed all the teeth of a child with a temporary denture, without causing the permanent teeth to grow in an abnormal position, and Federspiel<sup>24</sup> describes a case where, in spite of the absence through congenital causes of a number of teeth, the lower jaw was of normal size.

3. *Distoclusion*.—In cases where no signs of the arrested development of the apical base are traceable in the region of either arch one can occasionally find an extreme malocclusion characterized by the lower arch occluding too far back (Fig. 29). The term "distoclusion" is used of a malocclusion of such a kind, when it embraces the whole of the lower arch.

Weinberger<sup>91, 92</sup> has given illustrations of fetuses in which the positions of the jaws suggest that a distoclusion would have resulted if the individuals in question had lived. Thus already at so early a stage the entire lower jaw might show, so to speak, a predisposition to this malocclusion..

Distoclusion in the temporary denture has often been observed to occur; in the permanent denture also, even though the predecessors may have been in



Fig. 26.

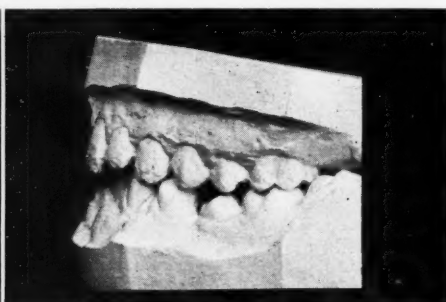


Fig. 27.

normal occlusion, and Zielinsky<sup>99</sup> considered that such a distoclusion was the result of an absent or inadequate lateral growth of the upper jaw. In such cases, therefore, one might reasonably expect that a distoclusion might without treatment be able to change into the normal if the upper jaw were artificially expanded. But then that should be able to occur in cases where a spontaneous lateral growth of the upper arch had taken place. This, in fact, seems to have been the case in Figs. 33, 34, 35, 36. Cases have also been reported of simply a mechanical expansion of the upper jaw being followed by the forward drift of the lower arch from distoclusion to normal occlusion.

The presence of distoclusion in cases where the apical base is normal, and its occasional asymmetrical appearance, shows that it must not be regarded as an arrested development. This is not inconsistent with the fact that it can arise as a secondary result of a disturbance of the apical base of the upper jaw, in accordance with Zielinsky's theory.

In those cases of distoclusion, where the apical base of both the lower and upper arch is normal, the opinion maintained by a number of authorities that it depended upon the underdevelopment of the lower jaw, or upon what, according to the generally accepted but not particularly happily chosen term has been

named "micrognathism," can only hold good if the underdevelopment consisted in the absence or the stunting of the development in the lower jaw, which would consist in a subnormal absorption of the anterior and apposition to the posterior margin of the ramus ascendens. Retarded development of this nature, limited to that part only, would, at least in a number of cases, be noticeable as operative during the period under which the anteroposterior development of the lower jaw takes place or up to the time when all the teeth have fully erupted.

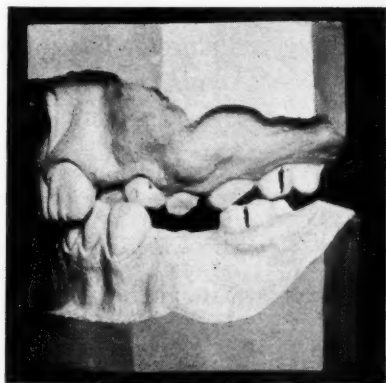


Fig. 28.

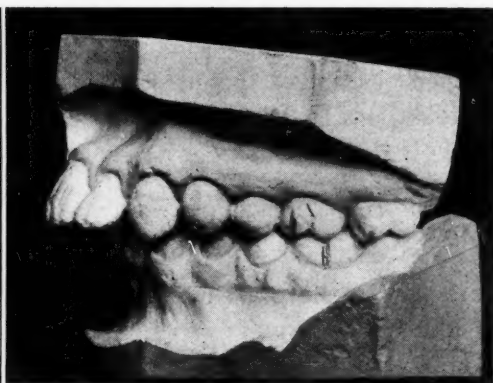
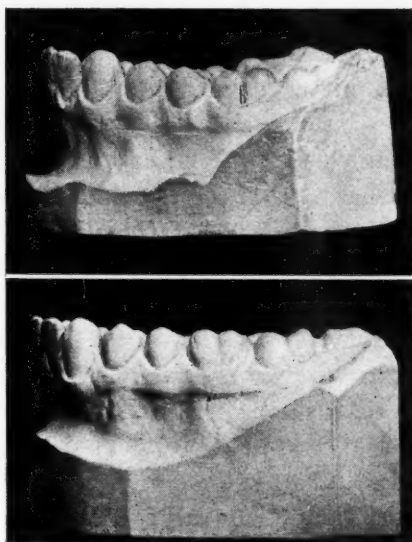


Fig. 29.



Figs. 30, 31.

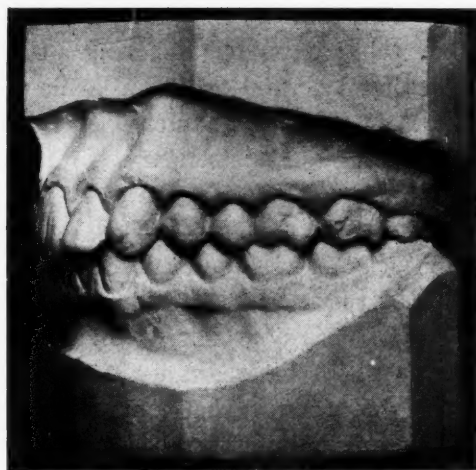


Fig. 32.

The distoclusion would then be progressive, about in the same sense as prognathism can be so, i. e., the disproportion between the position of the upper and lower jaw in the anteroposterior direction would become greater. Now the fact is that distoclusion in cases without local complications very seldom exceeds the mesiodistal diameter of a permanent premolar,<sup>23</sup> which distance corresponds to the maximum distal interdigitation in a second temporary premolar.

4. *Occlusal contraction of the upper arch.*—A dental arch normally formed and consequently founded on a normal apical base may under certain circumstances become deranged, or, as Thourén<sup>80</sup> calls it, have its articular equipoise

disturbed, when the opposite arch is in itself abnormal or else has a faulty occlusion. Of the many various kinds of such anomalies it is particularly those in connection with the upper jaw that are of interest here and which appear in connection with both the above-mentioned momenta of malocclusion—deficient anteroposterior development in the apical base of the lower jaw and distocclusion. It may happen with these that the arch of the upper jaw is compressed by the efforts of the upper lip to meet the lower lip (Angle). Another possibility is that the lower lip acquires a habit of pressing up against the lingual surfaces of the incisors of the upper jaw, resulting in a more or less pronounced fan-shaped position of these teeth. The former may take place, as is well known, in Angle's Class II, Div. 2, the latter in the same class, Div. 1, and was described by Angle in 1900.<sup>3</sup>

*B. Momenta of Malocclusion Caused by Abnormal Conditions in the Apical Base*

In spite of the presence of an equipment of teeth normal both as to their forms and number, and independent of the occlusion and the original mutual relation of the jaws, the forms of the apical base can be or can become such that the position of the teeth becomes abnormal. The abnormalities in the position of the teeth arising from such disturbances may in various cases be determined at various periods of the development of the individual case concerned. Thus Thourén<sup>84</sup> has noticed and depicted crowding during a very early stage of embryonal life, and Weinberger<sup>91, 92</sup> describes prenatal abnormalities in the position of the lower jaw, denoting prospective mesiocclusion. Other authorities have observed normal occlusion in the temporary denture followed by a crowding of the teeth in the permanent denture. Northcroft<sup>61</sup> described a normal occlusion at the age of thirteen, that is, in the permanent denture, which later developed into buccal malocclusion of the lower arch. Figs. 33 and 35 show an arrest of growth at the age of five, Figs. 34 and 36 the same case four years later. Fig. 38, and Fig. 40, six years later, show that the lateral breadth of the arch is capable of reduction. The same thing appears to have occurred in the case of Fig. 41, and Fig. 42, eight years later. Fig. 109 is a projection drawing representing the absolute reduction of the case Figs. 38 and 40.

The disturbances that come under this heading show the most varied method of development, but so much at any rate is evident, that they can appear at a very early stage, only to approach to the normal through a change in development occurring later on. In a number of cases they can remain practically unchanged; in others again they may, according to the nature of the abnormality, become worse, i. e., they are of a progressive character. However, not very much has been published on the individual development of these cases.

Anomalies in the development of the apical base are also very varied in their anatomical character. They are recognizable by abnormally great or abnormally small distances between the apices of the roots. It would, therefore, not be very difficult to assume the existence of over- and underdevelopments. But at any rate as far as one of them, the narrow palatal arch, is concerned, it is not absolutely proved whether the mass of tissue itself is diminished or whether it has grown in some dimension at the expense of the rest. To the

underdevelopment forms belong bimaxillary crowding and opistognathism: to overdevelopment progenie.

Of the abnormalities belonging to this class the majority are characteristic only of one of the jaws; bimaxillary crowding is to be found, as the name im-

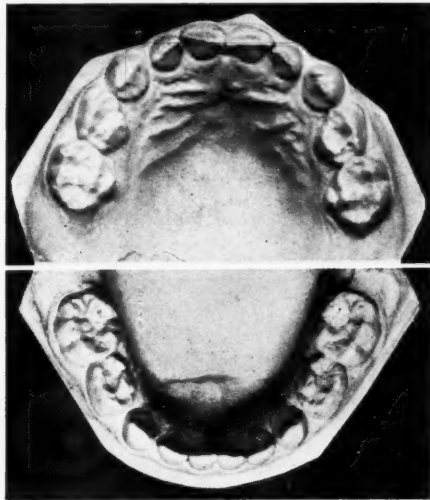


Fig. 33.

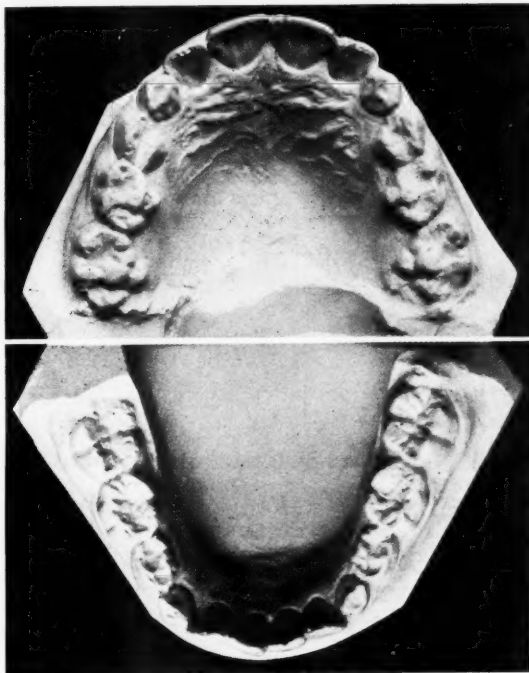


Fig. 34.

plies, in both. Common to them all is the fact that they appear symmetrically, even though the malposition of the teeth on the different sides may present individual differences. They have also been proved to exist in animals. Hereditary abnormalities exist in certain types of domestic dogs and also in a South American breed of cattle. Malocclusions have been produced by artificial means by

Mellanby<sup>59</sup> in dogs and by Howe<sup>37</sup> in monkeys. These apparently belong to the class of disturbances of the apical base. Similarly the abnormal development of the lower jaw which sometimes occurs in connection with acromegaly.

The varied abnormalities in the apical base, in which momenta producing malocclusion appear, the varied progress of the disturbances and their symmetrical appearance all go to show that here we have to deal with anomalies of an entirely different order from those treated in the previous chapter, and that within this group are brought together the results of conditions widely differing in their nature. The causes appear to be practically unknown, although many explanations have been attempted. The only combinations of causes that have so far been proved are apparently the connection between the acromegalous mal-



Fig. 35.

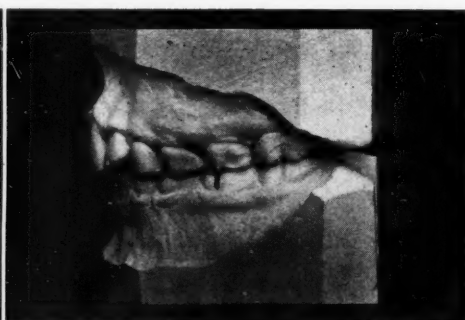


Fig. 36.

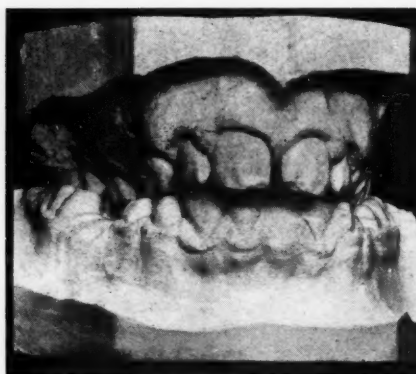


Fig. 37



Fig. 38.

formation of the jaw and the pathological condition of the hypophysis cerebri and also between the irregularity artificially produced by Mellanby and a diet that promotes rickets. The theory long since accepted by practitioners of orthodontia that disturbances of the apical base are the results of various disturbances in the throat and nasal cavity has now been proved to be no longer tenable. In this treatise a number of observations will be submitted for the purpose of showing that it is probable that an absent or deficient masticatory function cannot be answerable for the malformations in question. This view still has a wide influence and even authorities like Mershon<sup>60</sup> and Chapman,<sup>18</sup> who are among the least dogmatic of the adherents to the occlusion theory, have not been able to fully get away from this idea.

The limited number of cases which fall to the lot of each individual observer makes it obvious that the types of malocclusional momenta here described, which are caused by disturbances of the apical base, cannot lay claim to embrace all such. There exist abnormalities with regard to which it is difficult to determine whether they are to be regarded as due to faults in the apical base or in the teeth themselves. Such a type is that which is characterized by a formation of spaces that are more or less equally distributed over the various sections of the arches. This anomaly has been considered to be due to local factors of so different a character as enlarged tongue and too small teeth. It is left out here, as it is scarcely ever submitted to orthodontic treatment. For the same reason

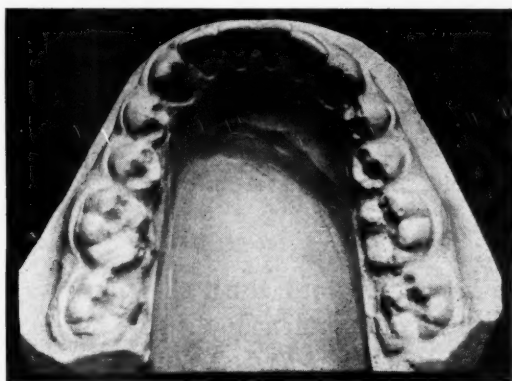


Fig. 39.

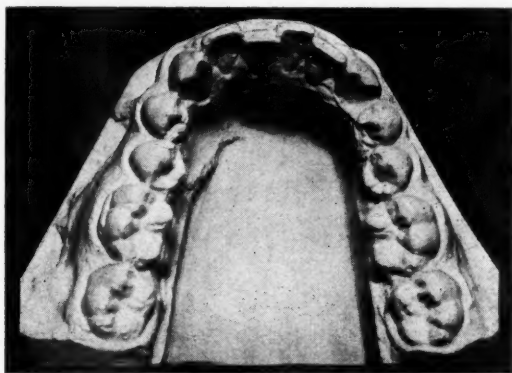


Fig. 40.

is omitted the case of the malformation of the jaw arising in connection with acromegaly. Only such forms will here be dealt with as I myself have had an opportunity of investigating and which are generally subjected to orthodontic treatment. According to the material available to me these momenta of malocclusion are as follows:

1. Bimaxillary crowding.
2. Opistognathism.
3. Narrow palatal arch.
4. Progenie.
5. Mordex apertus.
6. Horseshoe-shaped lower jaw.

1. *Bimaxillary crowding*.—A bimaxillary crowding in a permanent denture is recognizable by the apical curve being abnormally small in comparison with what it should be were it in harmony with the coronal curve in a normal approximate contact, thus causing the teeth to be irregular.

Several authorities, as Bogue,<sup>15</sup> Hawley<sup>32</sup> and Barnes,<sup>11</sup> have asserted that the absence of a spacing in both jaws in the temporary denture is invariably accompanied by a bimaxillary crowding, so long as no artificial expansion is effected. Others again have observed that this rule does not always hold good. Pfaff<sup>65</sup> relates a case of a good spacing which was succeeded by "contracted mandibular arches with cuspids erupting labially," and another without spacing which was followed by a normal position of the permanent teeth. According to Hatfield,<sup>31</sup> however, it appears that Delabarre had observed as early as 1819 that with persons who at the age of five to six years do not show spaces between the temporary teeth there exists a tendency to irregular positions of teeth. Other old authorities like Hunter, Fox and Bell had, according to Hatfield, their attention drawn to these facts, and it may seem strange that people are now inclined to desert Bogue and "return to the less dogmatic ideas which were held a century ago."<sup>31</sup>

With regard to bimaxillary crowding, therefore, we must regard it as definite that its existence in the permanent denture cannot with any certainty be foreseen during the temporary denture's functioning period, as according to Pfaff, a good spacing between the temporary teeth can be followed by crowding in the permanent denture, and since a narrow denture can under certain circumstances be improved without orthodontic interference. Such cases have been related by Wallace, Lourie and Northcroft. On the question whether an originally normal permanent denture can become contracted I have not found any data as yet published. On the other hand, it was stated that a crowding can arise and be aggravated in cases where traces of disturbances of the apical base have been established. In such cases as Pfaff mentioned, where the spacing was "good," these individuals in question may nevertheless have been abnormal in this respect, although at the time the abnormality had not yet become apparent. This agrees with the fact that there are peculiarities which do not become manifest until comparatively late in years. Roux<sup>74</sup> mentions as an example of this the similarity of feature in individuals of the same family which appears late in life, and he states that it happens that persons may in their old age have their handwriting altered to become like that of one of their parents. Fig. 7 shows a case of bimaxillary crowding.

As the term implies, this kind of crowding exists in both jaws. In very rare cases one meets with a crowding of the lower jaw resembling that appearing in bimaxillary crowding, at the same time as the upper apical base is of normal size. Figs. 43 to 45 show an example of this. The deep overbite, which has caused a lesion of the labial gingival margin of the lower incisors, has become aggravated by the loss of the lower first molars. It seems probable that distocclusion had been early developed. The crowding in the region of the lower front teeth gives the impression of being a subnormal development of the apical base, but as other factors have obviously complicated the result one cannot offer any positive opinion on the question. Another case in point is that of Figs. 9

and 10. Here too the apical base of the upper jaw is of normal size. The mesio-distal condition of the first molars shows a tendency to develop into distocclusion, but from the occlusion of the temporary second premolars it is clear that the case has originally been one of neutroclusion. The lower jaw, Fig. 10, shows a considerable subdevelopment in the front part. The case is marked by a striking delay in the second dentition. Thus at the age of thirteen, when the impression was taken, there were found twelve temporary teeth still left, at fifteen there were ten, at seventeen there were still six, viz, two upper and one lower premolar, one upper and one lower cuspid and one lower incisor. From the x-ray examination it was discovered that none of the permanent teeth were

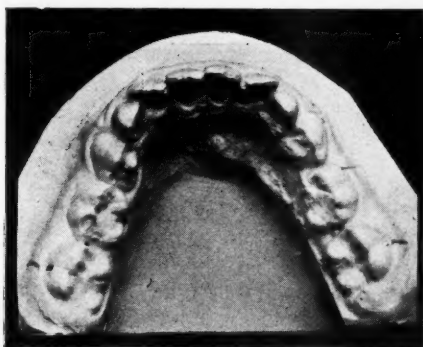


Fig. 41.

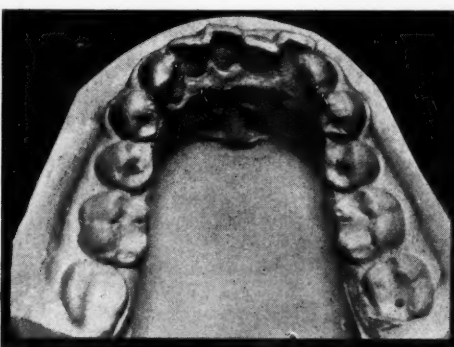


Fig. 42.



Fig. 43.

missing. It is possible that this slowly proceeding eruption of the second dentition has had different effects on the upper and lower jaws, affecting the latter more than the former. Under such circumstances it is more justifiable perhaps to regard this deficiency in the apical base of the lower jaw as a local-dental disturbance, so long as one does not regard the actual delayed dentition as a symptom of a general arrest of development. In which case the crowding is simultaneous with a complication which is far too uncommon for one to dare to liken it to the crowding of the lower jaw as seen in the bimaxillary cases. The cases of mandibular crowding so far observed by me have been caused by factors which give no proof of the existence of such a subdevelopment of the apical base simultaneously with a normal apical base in the upper jaw.

2. *Opistognathism*.—This term has long been used to denote such cases as those in which the upper jaw region is situated in posterior relation to the rest of the face. A case in which all teeth are otherwise in normal positions, but, say, the six upper front teeth are missing, would be a case of opistognathism. Such a case, however, does not belong to the special sphere of orthodontia. But Greve<sup>27</sup> has used the term opistognathism for a case of inadequate development of the intermaxillary bones, but with all teeth intact, and it seems to me better to use this old term for that momentum of malocclusion which in my first report I called "deficient development of the intermaxillary bone."<sup>52</sup> Strictly speaking this latter term should be used, but I prefer to follow Greve, as the term opistognathism is so much more convenient. In a classification such as

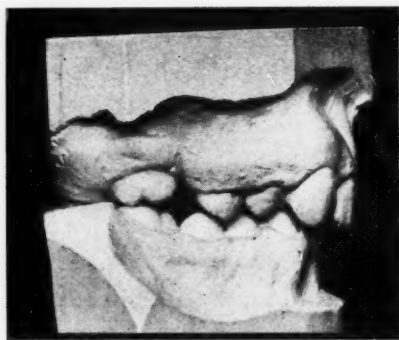


Fig. 44.

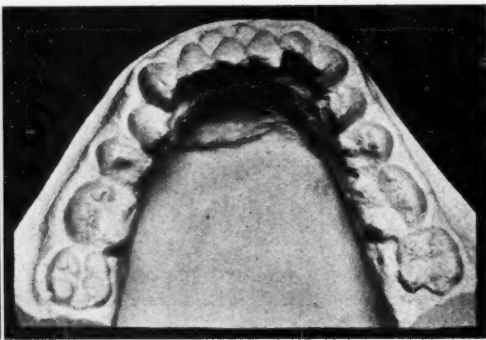


Fig. 45.

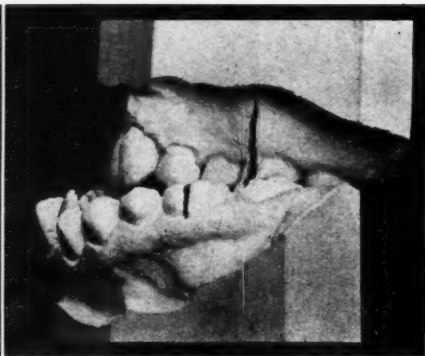
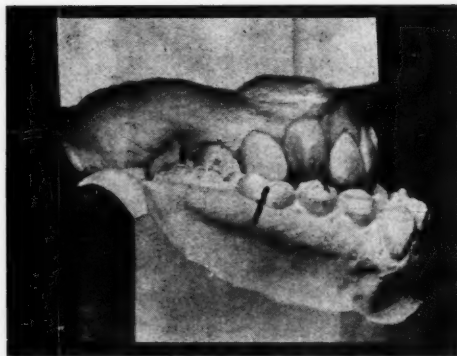


Fig. 46.

Case's, where a subdivision is called "Contracted retrusion of the upper denture," or as Greve's "Oberkiefer zurückstehend, Unterkiefer normal," there should be a place found for an opistognathism with all teeth in either jaw in normal position as regards one another and with normal apical base, but with the whole of the upper arch situated too far back. To find such a case would be difficult, and according to the theory of function such a possibility should be inconceivable.

One cannot, however, deny the possibility of such an anomaly even if the occlusion during the temporary dentition period were normal. For since the condition of the apical base can be abnormal, independent of the presence of the full complement of teeth, and such an abnormality can manifest itself in the position of the teeth as late as or even after the eruption of the permanent

teeth, the factor which in normal cases prevents the first upper molar from taking up the space to be filled by the second permanent premolar, i. e., the second temporary premolar, local-dental as it is, cannot prevent the arrested development of the apical base. If this arrested development delays the eruption of any of the permanent premolars, the consequence may be that the first molar nevertheless attains a sufficiently mesial position to attain a normal occlusion with its antagonist. If this does not occur, but if the permanent premolars and cuspids manage to erupt into the arch without being deviated, it may be supposed that the entire upper arch cannot follow the normal forward development of the lower arch, whence a "full upper retrusion" would result. I have not succeeded in diagnosing any such case in a human being.\* On the other hand it seems possible that the opistognathism, which is found in bulldogs and certain other breeds of dog, may be of this character. Through the kindness of Professors Sahlstedt and Agduhr I had an opportunity of examining the skulls of dogs in the Anatomical Museum of the Royal Veterinary College of Stockholm, and found that out of five skulls of bulldogs and one of a dwarf poodle, two were characterized by normal mesiodistal occlusion of the upper fourth premolar and lower first molar, and in the case of the four others the displacement varied between 2 and 11 mm.; the displacement in the region of the canines varied between 0 and 20 mm. The specimen which had a normal occlusion of the canines showed as the only deviation a slight lingual occlusion of the upper incisors, or labial of the lower, whichever it was. The mesiodistal malrelation being manifest in so far a posterior region, the possibility of a total opistognathism of the upper dental arch seems evident, resulting in what Case calls "Full upper retrusion."

Since a total opistognathism with normal apical base of the upper jaw is hardly possible, we must suppose the apical base to be more or less inadequately developed.

In consequence of inadequate development in the region of the upper front teeth, these teeth are generally† in lingual occlusion. But it is necessary to make a strict differentiation between opistognathism and other cases where these teeth are in such malocclusion, but where that fact has no connection with an arrested development of the intermaxillary bones. These latter malocclusions are purely local anomalies, denote no deficiency in the apical base, and as problems of purely dental malposition their treatment is very easy to execute. A case of this kind is illustrated in Fig. 47. Treatment of the malposed incisors was accomplished within a few weeks. We should compare with this the case of Fig. 8, which for corrective purposes required no less than twenty-six months.

3. *Narrow palatal arch.*—This momentum is characterized by a more or less marked deficiency in the development of the sutura palatina mediana

\*Since writing this I have had the opportunity of examining a case of "mesiocclusion," in which it seems possible that the whole upper arch is posterior to normal (see Fig. 46). The maxillary bones are abnormally small to an extent that the orbital ridges do not offer normal support to the balls of the eyes which consequently appear abnormally large. The case is complicated by a cleft-palate. Cases of excessive "mesiocclusion" are, as a rule, characterized by a large mandibular angle. In this case this angle was apparently normal. If we limit our observations to the anteroposterior conditions this case might be put under the heading of "Upper retrusion, lower normal." This is the only instance in my practice of what may possibly be considered as a total opistognathism.

†An exception is shown in Fig. 100, where only the laterals were in lingual occlusion.

or of the region on both sides. Upon making a diagnosis we should not allow any possible regularity in the front teeth to mislead us. The frontal section may in fact appear normal before the permanent cuspids have arrived. On the other hand the dental arch may be secondarily compressed without the apices being to any great extent displaced. Particularly is this common in distoclusion, and is generally considered to be a local consequence of the lower arch being situated too far distally. In my experience pure cases of narrow palatal arch are very rare, but this momentum is found in combination with others, such as distoclusion, mesioclusion and open bite. Fig. 38 is a case of narrow palatal arch. At the time of the impression being taken it seemed to be practically a pure case, but later on it became clear that it was not so. (Fig. 40.)

4. *Progenie*.—Strictly speaking progenie means a condition in which the chin is abnormally far forward in relation to the rest of the face. A progenie, therefore, might coexist with normal occlusion. It is an old established custom in dental literature to use the term for a lower arch projecting too far forward, and it is used so here too, because it is a very convenient term.

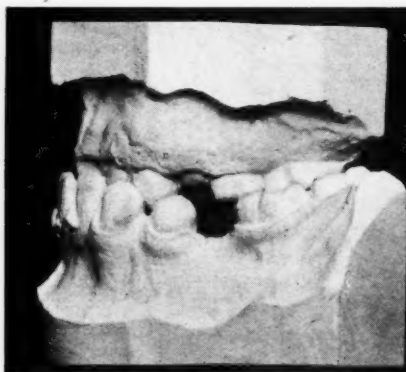


Fig. 47.

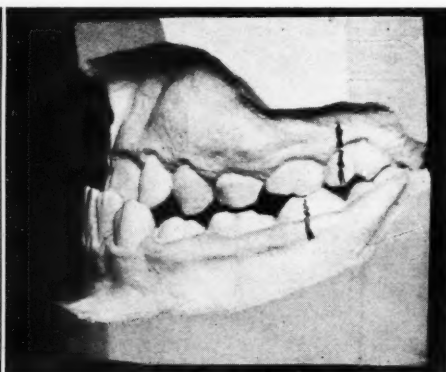


Fig. 48.

By progenie, then, is in this treatise meant a momentum of malocclusion appearing in a position in the case of the lower arch abnormally far forward in relation to a normal upper arch. Theoretically there is nothing to prevent the assumption that a progenie exists with the apical distances between the teeth of the lower jaw quite normal, and where the abnormality is simply due to the overdevelopment of the mandible in a sagittal direction, which development should then have taken place in accordance with what happened in Humphries' experiment. Often, however, the development is such that the apices of the roots form an excessively large arc in relation to the coronal curve. The crowns then maintain an approximate contact, which however is not of a normal character. It is of interest to note that of the cases in Class III of Case's latest work,<sup>17</sup> the majority show the front teeth of the lower jaw sloping with the root apices in a forward position. Out of the 12 cases published in that work, with clear illustrations, this occurs in at least 9 cases. Of Dewey's four cases<sup>23</sup> the same holds good for two, while of the two remaining cases the one is a local mesioclusion and, therefore, has no concern here.

On the assumption that the arch of the upper jaw has a normal apical base, a progenie, the term taken in an odontological meaning, is also a mesioclusion, if we are entitled to so call every abnormal position, however slight, of the teeth of the lower jaw in a forward direction. Nevertheless, it is worth noting that the momentum that causes progenie may have had so slight effect that the cutting edges of the lower incisors are not in labial occlusion (Fig. 51). Progenie is in its nature radically different from the prognathism which may characterize the upper front teeth. While in these latter the coronal curve is always proportionately too large for their apical curve, in progenie it is the apical curve that is, at least very often, too large. A progenie caused by a too small apical base, with the front teeth lying in the shape of a fan, is conceivable only under very exceptional circumstances. Figs. 48 and 51 show cases of progenie.

The abnormal development in progenie is not always limited to the sagittal direction, which indeed one would not expect it to be. The result appears in an increase of height and width of the apical base. Thus arise two additional forms of overdevelopment in the apical base of the lower jaw, which may be manifest as open bite or horseshoe-shaped lower jaw.

5. *Mordex apertus*.—The, from an orthodontic point of view, most important form of vertical overdevelopment is that which gives rise to a certain form of open bite. According to Lind<sup>49</sup> the overdevelopment originates in the molar region of the lower jaw; sometimes it may happen that such an overdevelopment is compensated for by a similar development in the other parts of the apical base, so that the opening of the bite fails to take place. In such cases there should consequently be a vertical overdevelopment of the entire apical base. An anomaly of this kind would hardly come within the sphere of orthodontic treatment, in so far as this art is limited to the treatment of abnormal occlusions and we do not, like Case, regard it as facial orthopedia having as its objective, among other things, the changing of normal occlusion to abnormal when sufficiently weighty reasons are considered to exist therefor.

Since at present we have no reliable method of determining in particular cases the normal height of the bite, it may often be hard to decide whether an open bite is caused by vertical overdevelopment or by infra-occlusion. As regards overdevelopments it is probable that they are not limited merely to one dimension. If, therefore, there arises simultaneously an overdevelopment of the apical base in a frontal or sagittal direction, the open bite is probably due to a vertical overdevelopment. Again, an infra-occlusion is an inadequate vertical development, and if it has not a purely local cause, as in Figs. 52 and 53, it is best to assume the possibility of the deficiency also manifesting itself in the horizontal plane. The simultaneous existence of an apical contraction would then denote infra-occlusion. Fig. 105 is a case of *Mordex apertus*.

6. *Horseshoe-shaped lower jaw*.—The apical base of the lower jaw is in these cases broader than normal in relation to the coronal curve, whereby the roots of the buccal teeth show a more than normal slope outwards. The shape of the lower arch, which in normal cases is generally described as parabolical,

is in this anomaly more elliptical. The lower arch, viewed from the occlusal surface, then resembles somewhat the arch of an upper jaw (Fig. 54). This anomaly often occurs simultaneously with enamel hypoplasia, with open bite and with mesioclusion.

All overdevelopment of the apical base hitherto described have concerned the lower jaw. The question, therefore, arises whether or not there is any proof of some similar condition to this in the apical base of the upper jaw. Angle illustrates a case<sup>6</sup> (see his Figs. 16 and 17), in which the spaces between a number of teeth in both arches seem to indicate a horizontal overdevelopment of the alveolar process. Angle himself considers the cause of this to be

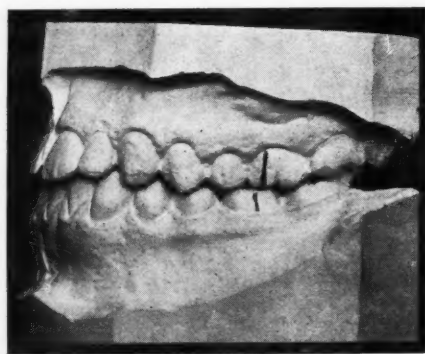


Fig. 49.

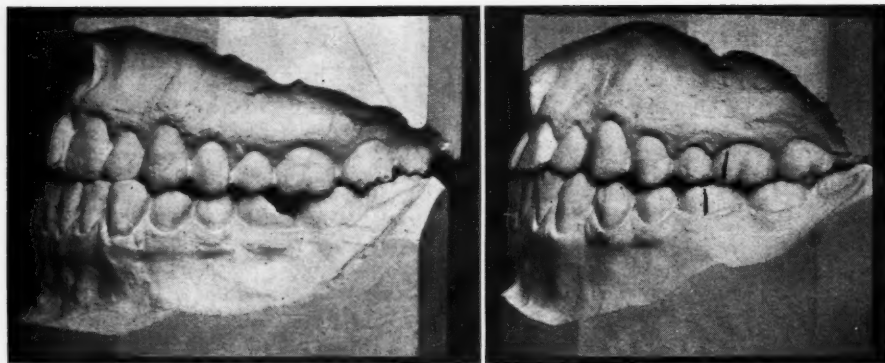


Fig. 51.

Fig. 50.

the abnormal size of the tongue. Greve<sup>27</sup> discussing the same case believed that it was due to the abnormal smallness of the teeth.

Keith and Campion<sup>40</sup> made comparative examinations of the skulls of individuals having normal and narrow palatal arches, and found that in the latter the alveolar processes of the upper jaw had increased in height. Again, the measurements of the lower jaws of similar individuals show (see their Fig. 12) no difference in the height of the alveolar process of the lower jaw, but compensation for the increase in the height of the bite, which had emanated from the increase in the alveolar development of the upper jaw, had taken place exclusively along the upper margin of the proc. coronoideus, incisura semilunaris and proc. condyloideus. These authors state that the height development of the upper jaw was in these cases accompanied by lack of width develop-

ment. A true overdevelopment in the sense of an increase in the bony mass has accordingly not taken place in the upper jaw, but what has happened is a shifting of the bone from a vertical to a horizontal direction.

The overdevelopment of the lower jaw, on the other hand, is due to an actual increase in the bony mass. The development, in whatever dimension it may successively occur, is not counterbalanced by subdevelopment in any other dimension, but, as already mentioned, the overdevelopment of the mandible can be observed either in the one or both the other dimensions.

Finally, there is a momentum of malocclusion in regard to which it is difficult to determine whether it is to be classed among local-dental disturbances or those of the apical base. This is:—

*Vertical deficiency in the apical base.* In bimaxillary crowding, opisthognathism and narrow palatal arch the inadequate development of the apical base is manifest in a frontal and sagittal direction. In the third dimension also, the height, the development may be arrested. This may be called vertical deficiency in the apical base. It is characterized by the region in the extension of the roots not being normally developed in height. Whether it ever may be



Fig. 52.



Fig. 53.

wholly or partly due to an abnormal shortness of the roots is not clear. Vertical deficiency may be manifest, as infra-occlusion and as "close bite."

An example of infra-occlusion which was the result of a limited section of the apical base failing to develop is shown in Fig. 53. Its history was as follows: At about seven years old, the patient fractured the crown of the right upper central incisor, resulting in an exposure of the pulp. The root was treated in the best possible way, but no artificial crown was inserted. When the patient was eleven, he sustained a fracture of the crown of the left central incisor. At about fifteen years of age, artificial crowns were inserted. As early as after the first or second year, a difference in the relative position of the two teeth began to be evident, the first that was removed appearing shorter, which was actually due to the other part of the alveolar process having developed in height as happens until the face is full grown. The earliest tooth that had first been fractured, tooth had not, so to speak, kept pace with the rest, and was thus left in its original position.

A further example is shown in Fig. 52. The patient was about twelve years of age. If we compare the distance between the apices of the roots and the margin of the mandible, we will find that it is not the length of the root that is the cause, but just the section in the extension of the root, i.e.,

a part of the apical base, which has undergone a vertical arrest of development. Since in this case the arrest of development is confined to the portion of the apical base underlying the tooth in question, it must be presumed that it is the tooth itself which has caused the disturbance. In both these cases the cause is purely local, and the infra-occlusion found here is thus to be regarded as a local-dental anomaly. This is also possibly true in the very common cases of distocclusion that are associated with close bite, as close bite may also be found in cases, in which the apical base is in other respects, i.e., in a frontal and sagittal direction, normal.

Are there then no instances of a vertical subdevelopment having the character of a genuine disturbance of the apical base? It would be very strange if the insufficient lateral growth of the intermaxillary bones in cases of opistognathism were in every case to be manifest only in a frontal or sagittal direction or in both these dimensions. An arrested development with such a dimensional limitation would be highly improbable. We would expect, therefore, to find cases of opistognathism and narrow palatal arch, combined with an arrest of development in a vertical direction also, and, analogous to the course taken by the case in Fig. 53, we would expect that cases of early opistognathism would develop into infra-occlusion in the intermaxillary region through the latter falling behind in the course of the normal vertical growth of the other sections of the apical base. I have not, however, been in a position to offer any proof of this.

*(To be continued.)*

## ORTHODONTOLOGY\*

### PRESIDENTIAL ADDRESS

BY A. C. LOCKETT, L.D.S., D.D.S.

I SHOULD like to take this, my first opportunity of thanking you for the honor you have bestowed on me which enables me to preside at this our second annual meeting since the World War. I need hardly tell you how much pleasure it gives me to do this to the best of my ability, as I know I am amongst a band of brothers and friends who are ready to help rather than be critical, and who would rather forgive than quarrel.

I have quite enjoyed the anxieties and work, with your secretary and treasurer, in getting this meeting together; it has afforded us some excitement in the preparation for the meeting, which was to have taken place in Amsterdam, and finally in getting papers from so many sources and countries, which we are anxiously waiting to hear read.

On behalf of the officers and members of this society I wish to extend a hearty welcome, and the right hand of comradeship to all essayists, guests and friends who are with us and have been good enough to come and give us the benefit of their education, experience and ability, and share the benefits of our meeting.

Many of you present here remember well the excellent meeting which took place in Paris in 1914. At that time our society, which had been in existence for about six years, may be said to have reached a stage of its growth and development which seemed to promise a great future for its usefulness and international reputation, as well as its professional standing. After all that has happened since then, and during a comparatively dormant existence of seven years, we brought the functions of our society back to life in London in August, 1922, replanted it on what we hope is a more secure foundation, and we are now about to erect a structure which I prophesy will be a credit to us all, not only as a society in name, but also in usefulness, enterprise, progress and scientific value to the profession to which we are proud to belong.

There is ample evidence of the good work which was done in the World War by members of orthodontic societies in all countries. The training of the mind and hand of all dentists interested in this branch of work, whether as general practitioners or specialists, had laid a groundwork in the minds of these gentlemen, and a storehouse of practical experience and knowledge on which they were able to make themselves of inestimable value to the poor suffering soldiers and officers of all the countries of the world engaged in the war.

\*Delivered to the European Orthodontological Society, July, 1923.

I do not wish to detract in any way from what the specialist did or was in a position to do in this respect, but I do say that the combined effort of the general practitioner as an operator and surgical agent, coupled with that of a varied experience in orthodontics, opened up a field of experience and practical usefulness which has made history and recorded its work for good in a manner and way which we have every cause to be proud of, and which he could not have done but for the experience acquired in an orthodontic training and mental interest in the subject, probably germinated and cultivated through the agency of some orthodontic society, school or practice.

Beyond recording these facts of the past, let us forget it all and forgive to the best of our ability, and apply the lessons only to our immediate needs and activities of the present day of our society, so that in years to come we will feel that we have built wisely and well a structure in which we have all had a hand, and it is to this object that I propose to devote the rest of my time in this address, to put forward a few ideas on what I feel ought to be done for the benefit of our society, to make it the success I am anxious it should be.

#### OUR PRESENT DUTY TO OUR SOCIETY

There are certain fundamental conditions and problems, on the successful solution of which the development of the European Orthodontological Society depends, and I will enumerate them for your consideration and careful thought at the commencement of our meeting. At our business meeting to be held tomorrow, it is hoped that every member will make a point of being present to go into the details of these fundamental facts and problems and offer ideas and suggestions which will make it possible for us to solve the difficulties which, to my mind, lie in the path of an assured and progressive development.

1. The European Orthodontological Society cannot make its own development; it cannot serve the useful purpose for which it was started, if it is left to develop itself. It must have a parent. Some one man or small committee, living in the same city, ought to be appointed for a period of not less than three years, and make it his or its business to work out a development scheme and report progress at each annual meeting.

2. At the end of three years the functions and threads of work should be carefully handed over to the successor to carry on or improve.

3. Duties of this description cannot be successfully performed by being in the hands of yearly presidents and secretaries.

4. By its very nature and name (the European Orthodontological Society) every effort should be made to enroll the cooperation of every other national orthodontia society or orthodontic section of a dental society in Europe, so that representatives of these societies may join us each year at the annual meeting.

5. *Dates of Meetings.*—This is the most difficult of all the problems we have to face, largely because we are not cognizant of all the facts and necessities and difficulties which each nationality is faced with. It is not

beyond our ability to solve this, if the matter is approached in a spirit of sympathetic consideration and compromise.

6. The annual meetings should, for the next few years, be held in cities where the best meetings are most easily arranged and assured, from the standpoint of scientific interest, and where it is most suitable for a large attendance of its members.

7. Every effort should be made to attract the help and support of our friends in America.

8. Each member should make it his business to persuade his friends to become members of our society, and increase the membership roll to at least 300.

9. Given a satisfactory solution of these problems and the faithful and loyal support of its members, there is nothing which can rob us of the distinction of placing our society on a pedestal of prominence, international usefulness and function, which it is our pleasure and privilege to erect.

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#### ORTHO-RHINO-ODONTOLOGY AND ACTIVE TREATMENT OF DEAFNESS\*

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BY DR. L. DELALBRE, PARIS

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UNDER the present conditions of medical science, when a doctor is called upon to treat a patient for deafness, he has a very distinct tendency to divide deaf persons into two great categories, namely, curables and incurables. If the patient suffering from deafness is fortunate enough to be classified by his doctor in the category of curables he is almost certain of obtaining great improvement in, and often the cure of his affection, because it was possible to pronounce a favorable prognosis from the very beginning. If, on the other hand, the original diagnosis is that of chronic deafness, all the unfortunate sufferer will receive from his doctor will be some words of consolation, and he will be reduced to continue for the rest of his life with his cruel infirmity.

It is in order to enable doctors in general, and certain specialists in particular, to abandon this tendency to divide deaf cases too markedly into two categories that we are writing these lines. We should like never to hear again the repetition in all classes of society, by much too large a proportion of deaf people, of the sentence which has become classic: "My doctor told me there was nothing to be done about it," whilst more often than not the doctor has not exhausted every means of attempting to effect a cure. The object of this communication, therefore, is to point the way for procuring better hearing for the majority of people, young and old, suffering from chronic deafness, in whose cases the usual methods of treatment have failed; we have endeavored to set forth succinctly and as clearly as possible a combined series

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\*Delivered to the European Orthodontological Society, July, 1923.

of therapeutic measures of a nature to strengthen the auditory acuity of certain deaf subjects too hastily considered as real incurables.

The proportion of favorable results (approximately 70 per cent) which we have been able to obtain during the last five years in a series of more than a thousand cases of deafness, warrants our laying down at the head of our statement the following fundamental principle:

Deafness in human beings is an infirmity which the doctor can very often cure and can almost always attenuate, even in cases of the longest standing, when the internal ear or labyrinth, the acoustic nerve and the auditory nerve centers, normally developed at birth, have not become completely degenerated by disease or destroyed by traumatism.

This principle is incontestably demonstrated by the numerous detailed observations which we have made, in the course of several months, in connection with each of our patients suffering from deafness of long standing. The majority of them had already been treated elsewhere by the ordinary methods without any substantial results. We cannot in a short communication of this nature enumerate these observations, but we can give the assurance that they form an important record which we expect to publish a little later.

It is an extremely easy matter to prove the correctness of the first statement of our fundamental principle. It is a fact that the doctor can very often cure deafness. We are speaking here of the specialist, of the otorhinolaryngologist. He cures deafness in the case of acute affections of the ear which do not involve too great damage of certain anatomic parts of the ear. For instance, in all cases of ordinary internal otitis, of foreign substances and of tumors of the external auditory meatus, of acute inflammation of the tympanum, of acute, intermediary, catarrhal otitis; also in the case of certain chronic affections of the ear such as chronic intermediary suppurating otitis, and complications caused by suppurating otitis (acute mastoiditis, cholesteatomas, congestion of the labyrinth, suppurating labyrinthitis). Further, the otorhinolaryngologist is often successful in curing deafness when it is due to an obstruction or to chronic or acute affections of the nose, of the nasal cavities, of the nasopharynx, or of the fauces (various forms of coryza, mucous polypus, adenoids, sinusitis, angina, hypertrophy of the tonsils, palatine and lingual, etc.). It suffices for him to effect the ablation of the spurs, of the polypus, of the adenoids, etc., and to treat the diseases of the cavities in question.

But apart from the above-mentioned cases, which occur in current practice, the specialist in general does not apply himself very energetically to effecting a cure of obstinate deafness when he realizes that it is due either to a cicatricial otitis or to actual sclerous otitis, or to labyrinthitis. And he is still less inclined to advise decisively active treatment of obstinate deafness, in view of the fact that the most authoritative masters in otorhinolaryngology teach and write, for instance, the following: "Unfortunately, no

really efficacious treatment of true sclerous otitis exists. All that is done is often the application of symptomatic therapy."

After having in vain tried the methods usually employed in cases of cicatricial otitis (artificial tympanum), and of auricular sclerosis (tube massage, external massage), all of which have so far given but slight therapeutic results, the medical practitioner is forced to have recourse to general medical practice if he wishes to obtain better results. Should he then, as is generally taught, confine himself to the application of symptomatic therapy? In our opinion, he can do very much better than this, and we shall proceed to demonstrate it.

#### THE DOCTOR CAN ALMOST ALWAYS ATTENUATE DEAFNESS

In order to prove the second statement of our fundamental principle set out above, let us group in one synthetic formula all the causes likely to increase or to decrease the value of the auditory acuity in men. We will, therefore, write:

$$A = F(f_1, f_2, f_3, f_4, f_5).$$

which we will express by saying—Auditory acuity can be considered as being the effect of various effects.

In this formula the auditive acuity "A" is the resultant of the value and of the significance of each of the various effects  $f_1, f_2 \dots$  which are themselves actual resultants of the value and the significance of several factors. In order to make our meaning perfectly clear, let us set out the following equations:

$f_1$  = Degree of anatomic integrity of the ears, with its factors of influence:

Congenital or developed vices of conformation of the ears;  
Traumatism of the ears;  
Definite pathologic degenerations of the ears.

$f_2$  = Functional condition of the nose, of the nasal cavities, of the nasopharynx of the sinus, of the pharynx with its factors of influence:

Congenital developed vices of conformation;  
Traumatism;  
Pathologic degenerations of the various natural cavities in question.

$f_3$  = Functional condition of the buccal cavity, with its factors of influence:

Congenital or developed deformities;  
Traumatism;  
Pathologic degenerations, more particularly of the maxillaries and of the teeth.

$f_4$  = General physical condition of the patient, with its important factor of influence constituted by:

Disorders of nutrition in general (lymphatism, arthritism, etc.).

$f_5$  = Psychic condition of the patient, with its important factor of influence constituted by:

Neuropathic disorders in general (neurasthenia, hysteria, etc.). If we wish to remain in the domain of logic, the successive consideration of these five equations will enable us to formulate immediately absolutely precise and practical therapeutic conclusions.

In the first place, no objection is possible as to  $f_1$ , for it is obvious that in the case of a given subject, the auditory acuity "A" is all the greater in proportion as the degree of anatomic integrity of the ears approximates the normal auricular construction in men. For a given subject, therefore,  $f_1$  can be considered as an invariable term of the general effect F, even if congenital or developed vices of conformation, even if some traumatism or other, or definitive pathologic degenerations, all of them factors of influence of a strictly auricular nature, have made of "A" an auditory acuity more or less differentiated from the normal condition.

Secondly, taking into consideration our clinical experiences, the simultaneous observation of the two effects  $f_2$  and  $f_3$  enables us to establish that the greater the normality of the functional condition of the nose, of the nasal cavities, of the nasopharynx, of the sinus, of the pharynx, and of the buccal cavity, the greater will be the value of the resultant A; in other words, that the auditory acuity varies in direct ratio to the functional condition of the various natural cavities in the neighborhood of the ear.

Finally, always taking into consideration our clinical experiences, the simultaneous observation of the last two effects,  $f_4$  and  $f_5$ , warrants the statement that the greater the normality of the physical condition in general, and of the psychical condition of the subject, the greater the value of the resultant A; or, in other words, that the auditory acuity varies in direct ratio to the general physical condition and the psychical condition of the patient.

We are thus able, by deduction, to establish the bases of our general principle, bases which we can consider as being the conclusions of our work.

#### CONCLUSIONS

1. When a doctor is called upon to treat recent deafness, or deafness of long standing, he must systematically contemplate the triple application of otorhinolaryngology; orthodontology; general medical practice.

2. The doctor must not treat deafness by means of one of these three branches of medicine to the exclusion of the two others, for each of them is of equal importance in the active treatment of deafness.

3. Whenever it is absolutely obvious that otorhinolaryngology must be applied with a view to effecting a cure, it is the specialist in this branch of medical science who must act first, particularly if it is urgent to correct certain vices of conformation, congenital or developed, of the nose, of the nasal cavities and of the nasopharynx, as this correction falls within the domain of a subdivision of otorhinolaryngology, which we are agreed to designate as orthorhinology.

4. In the case of manifest deafness with coexistence of congenital or developed distinct deformities of the buccal cavity (maxillaries and teeth), it must always be ascertained whether, apart from all other influences, there may not be the relation of cause and effect between the deformities noted and

the deafness to be treated. In the affirmative, the corrections to be carried out must be entrusted to a specialist in orthodontology. Let it be said, in passing, that this branch of medicine has made great progress during the last few years, and that certain orthodontologists have succeeded in rectifying such deformities as abnormal maxillaries and irregular dental arches.

Further, favorable effects have been obtained, by rectifications of the buccal cavity, on the timbre of the voice, on the pronunciation, and on hearing. It would be unpardonable on our part if we did not mention here, among other consequences of these rectifications, the wonderful alteration produced in the appearance of the subjects operated on, for many faces previously deformed and even ugly have become almost pretty by reason of the new relation established between the jaws and the attenuation or disappearance of some coarse features. It has been our good fortune to see and to be able to study closely some superb collections of plaster casts and photographs taken before and after the operation, in the possession of some orthodontologists; we hope to make these collections known shortly to our colleagues. Before closing these remarks in passing, we think it our duty to give some particulars as to the influence on deafness of deformities of the buccal cavity. At first sight one is entitled to ask oneself whether in reality such deformities can have any influence on the hearing. Nevertheless, it cannot be denied that there exists a double connection between the functional condition of the buccal cavity and the value of the auditory acuity. This double connection is constituted by mechanical influences on the one hand, and by psychic influences on the other.

In the case of mechanical influences, faulty positions and functioning of the jaws, for instance, interfere of necessity with the hearing in the same way as an obstruction of the nose, of the nasal cavities, and of the nasopharynx, since all of these factors prevent the normal aeration of the tympanum box and the sufficient expulsion of its secretions into the pharynx through the Eustachian duct. In such cases, the movements of deglutition alone are incapable of sufficiently opening the orifice of the duct on the level of the lateral wall of the nasopharynx. These mechanical influences are obvious in themselves.

As regards psychic influences we all know how certain neuropathic general disorders are accompanied either by buzzing in the ears, which seems to weaken the hearing, or by absolute deafness (cases of hysterical deafness) although, nevertheless, the auditory organ is in perfectly sound condition. Now, among those suffering from deafness through neurosis, the nervous exasperation is a permanent condition, because by reason of the exaggerated deformation of their face in the neighborhood of the jaws they are forced to live almost the life of a recluse. It is indisputable that in the case of such patients the thorough correction of the jaws is likely to relieve them fairly rapidly of their neurosis and of their deafness. As a matter of fact, this happens both in orthodontology and in orthorhinology. We have in the course of our current practice of otorhinolaryngology, come across several patients whose neurasthenia, accompanied by considerable enfeeblement of hearing, was maintained by the constant worry of a deviation, sometimes but little marked, of the nose as a whole. In such cases it has been sufficient to correct

this nasal deviation to bring about the rapid disappearance of the neuropathic disorders and their consequences.

5. Whenever it is absolutely certain that a case of deafness does not call for the intervention of otorhinolaryngologist or of orthodontologists, or when such a case of deafness is not improved in spite of the intervention of these specialists, it is essential to treat such deafness by pure general medicine, observing certain rules which almost always result in improvement and sometimes in actual cures, even when dealing with deafness of long standing.

In those rare cases in which general medicine is as powerless as special treatment to bring about relief—in such cases only is the doctor justified in deciding that the deafness treated is incurable. There are certain rules which it is absolutely essential to follow in the active treatment of deafness by the application of general medicine. While these rules are theoretically justified, they result more particularly from clinical experiments. Theory alone already shows that in order to treat deafness efficaciously we must endeavor to modify the general condition of the patient whenever the latter shows a diathesis or obvious predisposition of a special nature (lymphatism, arthritism, etc.). This applies to obstinate deafness, since this is ordinarily the consequence of cicatricial otitis, of veritable sclerous otitis, or of labyrinthitis.

We know, indeed, without going into the anatomic and clinical details of these three varieties of auricular affections that, as a general rule, they are characterized by the development in one or more parts of the ear either of fibrous-retractile tissue (cicatricial otitis), or of atrophied sclerous tissue (atrophic sclerous otitis), or of thickened tissue (interstitial sclerous otitis), or, again, of congestion or hemorrhage (labyrinthitis). Now, from the pathologic point of view, sclerosis and congestion also mean disorders of the general nutrition giving rise, for instance, to arthritic diathesis, since the general physical condition is that of least resistance, resulting in general neuropathic disorders which bring about a deficient psychic condition. This explains the close correlation existing more often than not between a more or less accentuated general pathologic physico-psychic condition and obstinate deafness, accompanied by attacks of vertigo and of buzzing in the ears. We thus reach the practical side of the question.

#### THERAPEUTIC RULES

These are based on extensive clinical experience. In order to be successful in the treatment of obstinate deafness, whether or not accompanied by vertigo and buzzing in the ears, every medical practitioner must:

- (a) Not confine himself to the application of symptomatic therapeutics, which is nearly always insufficient.
- (b) Devote himself systematically to effecting the cure of any diathesis which may exist.
- (c) Urge the patient to follow the treatment with perseverance.
- (d) Never lose sight of the very important influence of a suitable diet, especially antiarthritic.

- (e) Be convinced that iodine is the basic medicament of general therapeutic treatment, and that its prescription is confined to certain forms of presentation likely to comply with the following conditions:

Prolonged iodized treatment without fear of iodism, both in the case of children and of adults.

Iodine absorbed in the free metalloïdic state, without any true combination, that is to say, in its original state.

Iodine absorbed in daily homeopathic doses, that is to say, infinitesimally small doses.

Iodine capable of preventing flocculation, that is to say, capable of preventing the destruction of the colloidal architecture of the tissues of our living organism.

In order to give an idea of the vital importance of this condition requiring that iodine shall have this deflocculating property, we feel constrained to reproduce here the general conclusion of the masterly work of Auguste Lumière on *The Colloidal Theory of Biology and of Pathology*, namely:

"The colloidal condition is an essential of life;  
Flocculation brings about sickness and death."

#### CONCERNING THE CHOICE OF IODIZED PREPARATIONS

The ideal iodized preparation is that which complies with all the conditions herein above set forth. In our opinion colloidal iodine is the most suitable form, because it corresponds in all points to our desire for the cure of diathesis. This paper would not be complete if we did not add that it is necessary to make a judicious choice among the various colloidal iodine products. It is absolutely essential that the colloidal iodine adopted should be a scientific preparation in the strictest sense of the word, and that it should distinctly show all the colloidal characteristics (semifluid and not solid appearance, Brown's movement under the ultramicroscope, Tyndall's phenomenon, electro-positive or electronegative direction, etc.).

- (f) Further, the doctor must not omit to treat any neuropathic disorders which may be coexistent, and this, either by therapeutics or by suggestion.
- (g) More often than not, he must reinforce the medical therapeutic action and the suggestive action by the daily application, comparatively prolonged, of galvanic electric current, of low intensity, under conditions determined upon.

#### DISCUSSION

The paper was in French, and was discussed in that language by Dr. d'Alise, Dr. Borsch, Dr. C. Even and Dr. Quintero.

*The President*, in opening the discussion, said the subject was a very interesting one, and he hoped it would be discussed thoroughly. He always considered that the greatest compliment that could be paid to an essayist was to offer liberal criticism, and if the criticism happened to be favorable the author would not object. Unfortunately he himself was unable to offer any criticism as he could not speak French.

## OCCLUSION—THE FUNDAMENTAL ELEMENT IN DENTAL SCIENCE\*

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THE assertion implied in the title of this paper should need neither defense nor explanation. Yet, when I have presented my views as to how profoundly occlusion influences the health of the entire dental mechanism, you may feel that some defense of these ideas would be in order.

The first studies of occlusion were made by the prosthodontist, or rather the dentist, in his frequent capacity as a restorer of teeth for the edentulous. When the first "plates" were made, they had to satisfy two requirements—they had to perform the function of mastication and they had to "stay in place" with comfort during this process. The earlier dentist found that while he might make artificial teeth which would have occlusal contact, this did not necessarily provide function and stability. He early focused his attention upon the manner in which his artificial teeth "hit" upon each other and recognized the necessity for a definite relationship of each tooth to all others, in order to provide for their greatest usefulness.

Until very recent years, the study of the mechanics of occlusion has remained in the hands of those doing full denture prosthesis. Even the orthodontist began his work with a primary view of improving the appearance of his patients. In fact, it may be said that the studies of occlusion which orthodontists have made even in recent years, have for their basis the improvement of the dentofacial relations, rather than the development of function. About ten years ago, when the periodontist began to study and increase his knowledge in the field of periodontal disease, he found that his efforts in treatment began to revolve to a large extent around the problem of occlusion. Where the prosthodontist found that instability of his dentures was related to faulty occlusion, the periodontist found that the cause of instability of the natural teeth was due to exactly the same kind of mechanical discrepancy.

The periodontist began his ministrations by operating on the various affected teeth as individuals; and with his attention focused on a disease process occurring in vascular tissues. He looked upon the periodontium as the locus of a pathologic process having but slight relationship to anything mechanical. At the present time, periodontists are focusing their attention on the mechanoanatomic factor in occlusion which has become widely recognized as dominating the pathologic picture.

I wish to present a conception of the teeth and their supporting structures, including the jaws and temporomandibular joint, as comprising a highly developed and delicately adjusted mechanism. I do not wish you to forget, nor shall I forget, that this mechanism is made up in large part of vascular tissues, subject to nutritional and other disturbances. But I do

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wish to impress upon you that which I believe to be a fact, viz., that the health of the structures which comprise this mechanism is primarily linked up with the mechanical coordination and harmony of the occlusion. Also, that just as the automobile, for instance, requires the harmonious adjustment of all its parts for continued economical functioning, so does the human dental mechanism require harmonious adjustment in order that it may perform its functions without injury to itself. The point I wish to make is that the teeth and jaws are a mechanism, subject to the laws governing all mechanical things; differing from a man-created machine chiefly in the marvelous fact that the former is composed of living tissue cells and powers of self-regeneration which the man-made mechanism does not have.

It is very easy for us to confuse self-regeneration, a power inherent in the living organism, with self-adjustment, a faculty possessed by the dento-alveolar mechanism in only a minor degree. In other words, adjustment of mechanical incoordination of the teeth, through the attrition of occluding tooth surfaces, occurs less successfully than casual observation would lead us to expect.

Perhaps it will be advantageous to follow the analogy of the machine a little further. We know that the gears and other moving parts of the automobile must be perfectly formed and correctly assembled, in order that they may function without doing injury to themselves or to the rest of the apparatus. We also know that wear of moving parts is inevitable in all mechanisms, and that this wear, when it occurs, requires a compensating adjustment of all physically related parts. My observation has been that whenever we find patent deformity of the occlusal surfaces through wear, there is usually found a concomitant disbalance in function. This is a very important point.

We see in nearly all mouths, especially in those having a minimum of artificial restorations, evidences of more or less wearing away of the occluding surfaces through their contact with each other. It is but natural to assume that mechanical incoordination of these surfaces would be adjusted perfectly and universally by this same process which produced the deformity. This is, however, far from being the case. Due to the yielding character of the periodontium, even though very slight in extent, natural self-adjustment is seldom carried to that point of perfection requisite for the attainment of adequate occlusal balance.

When a lack of occlusal harmony exists from the time of the eruption of the teeth, it frequently happens that an abnormal occlusal habit will be developed. Under such circumstances, tooth deforming attrition of the opposing surfaces will take place, but the tendency is usually toward an exaggeration of the occlusal deformity, a condition which throws the dental mechanism still further out of functional balance. Here we recognize a failure of Nature to reduce an occlusal deformity through normal mechanical wear, a condition which should apparently make for self-adjustment.

When periodontists began to study occlusal relationships from the standpoint of their bearing on the health of the periodontium, they soon came to recognize a distinction in occlusal adjustment more delicate than had previously been conceived to be required. Teeth whose occlusal relations as meas-

ured by the eye were perfect, were found to be in a state of traumatic occlusion when judged by the criterion of periodontal health. Moreover, when adjustments were made which might be so slight as not to be discernible to the eye, the sharp improvement in the health of the supporting tissues was so marked as to compel the realization of the extreme delicacy of the mechanical relationships involved. I wish to pay tribute here to the work of the prosthodontist and orthodontist in the problems of occlusion. At the same time, I believe that the work of the periodontist will result in a refinement of our knowledge on this subject which will be of immense value in all branches of dentistry.

So far, I have taken for granted the general acceptance of the postulate that traumatic occlusion is the most important factor in the etiology of most cases of periodontoclasia. Nor shall I take up your time with an effort to justify this theory. It is, however, requisite that a few words be given on the relationship of this factor to various pathologic disorders in the mouth. When there is a lack of balance in the occlusal relationships of the teeth, whether natural or artificial, certain teeth receive an occlusal stress in excess of that which Nature and the laws of mechanics decree. This produces in the course of time, an irritation of the entire periodontium, which may manifest itself in either vascular or neural disturbance, or both. Through this disbalance of physiologic equilibrium, local nutrition is interfered with and infection induced. It is for this reason that I have stressed so consistently the thought of the dental mechanism as an apparatus, together with the requirements of harmonious adjustment of its moving parts.

I would not have it thought that I desire dentistry to become more mechanical than it has been—nor, on the other hand, would I have it less so. Agreeing as I heartily do with the present trend toward a more adequate training in science for the dentist, I nevertheless, wish to keep in your mind the thought that while dentistry has as its chief concern the diseases occurring in living tissues, it is practiced largely through the medium of mechanical operations. It has been my observation that as dentists give more attention to the allied medico-theoretical aspects of their work—those so-called scientific branches—they tend to become less adept in the application of technical measures for the treatment of the diseases which they have been studying. *What dentistry needs for its development is not more science and less mechanics, but more science and better mechanics.* These thoughts could not be more clearly expressed than in an editorial which appeared in the *Dental Cosmos*, September, 1924:

“Dentistry has taken its proper place as a biologic science and its mechanical procedures are now viewed in the light of engineering problems definitely related to the biologic field. It is this recognition of the importance of the biologic factor in dental practice that constitutes the greatest advancement of present-day dentistry; an advance which may be counted as a direct and immediate result of the recognized and advanced dental educational curriculum.”

Assuming that the theory of physiologic, or so-called balanced occlusion as being of primary importance in periodontal disease, is acceptable, we now

come to its application. The questions which should be of interest at this point are:

1. How shall we determine whether a given occlusion is physiologic or pathogenic?
2. Is it necessary that visible disease be present to confirm a diagnosis of traumatic occlusion?
3. On what shall a choice of a method of treatment be based?
4. How shall we determine when the traumatic occlusion has been entirely relieved?
5. How may we determine whether a corrected traumatic occlusion has recurred?

Let us discuss these questions in sequence:

HOW SHALL WE DETERMINE WHETHER A GIVEN OCCLUSION IS PHYSIOLOGIC OR PATHOGENIC?

This question implies the consideration of a mouth in which there is no visible evidence of disease. It should first be made clear that an occlusal relation may exist which may be designated as a traumatic occlusion, but which has not, at the time of observation, produced visible tissue injury. It is termed at such a period a potential traumatic occlusion—a condition which if left uncorrected will ultimately produce actual injury. Whether we are to attempt its correction at the time it is observed is beside the mark. The important thing is to note the condition and take suitable precautions against subsequent development of disease.

As a result of my studies in this field, I have come to recognize certain characteristics of the teeth and of their arrangement in the arches as constituting a potential source of injury. I would first call attention to teeth having long sharp cusps and deep sulci. No matter how perfect the occlusion of such teeth may be, their occurrence in the modern underdeveloped jaw spells most inevitable future damage to the supporting tissues. The close interlocking of such teeth causes tremendous lateral leverage against their supporting structures when the jaws are used in eccentric occlusion. Moreover, in such a mouth the full exercise of the function of the teeth and jaws is inhibited. The periodontium thus fails to attain its fullest development. And deficient blood supply, lowered resistance and disease developed through tissue disuse is the natural sequelae.

Were jaws having locked cusps, such as I have described, found in a state of normal orthodontic occlusal relation, harm would still follow. It has been my observation that this class is almost invariably associated with a condition of occlusal disbalance, which produces individual traumatism here and there about the mouth. At any rate, they are always to be looked upon as a source of danger. On the other hand, such cases are commonly very pleasing to the eye, and not infrequently are affirmed by the orthodontist as representing an ideal occlusion. They may be claimed to be orthodontically correct, yet found functionally incapacitated, at least to some degree. Such a dental mechanism is actually defective in regard to occlusal balance.

We have so far been speaking of teeth whose occlusal arrangement was within the bounds of what is actually classified as "normal" occlusion. We now consider those cases in which some degree of malocclusion exists: The most common instance is that in which the "overbite" of the anterior teeth is out of harmony with the curve of Spee. In these cases, when the mandible is protruded, the jaw rides forward on the lingual surfaces of the maxillary incisors in contact with the labial of the mandibular—these teeth receiving thereby the entire force exerted by the muscles concerned in this movement. In such cases the element of trauma is frequently to be detected at a very early age—even where the overbite is apparently slight, it will frequently be found that the maxillary and mandibular incisors are in contact in the protruded position of centric occlusion, while the posterior teeth are widely disoccluded. This does not necessarily constitute a traumatic occlusion. It has been my observation, however, that periodontoclasia follows in the majority of cases.

It is, of course, a fact that in a fair percentage of such cases as I have just described, the opportunity for occlusal function is present. Under such circumstances it might be possible that, through the agency of wear of the occluding surfaces, a potential traumatic occlusion could be corrected by the means which Nature has provided, viz., a so-called mechanical "wearing in" of the occluding teeth.

We now come to those cases in which the probability of the existence of traumatic occlusion is more obvious, viz., cases exhibiting definite malocclusion. (The term malocclusion is here used in the orthodontic sense.) It is in such cases that the vast majority of periodontal lesions develop.

We must here make the distinction between malocclusion and traumatic occlusion. The terms are not synonymous, although they have frequently been thus employed. I have seen many cases exhibiting pronounced malocclusion in which there was no perceptible interference with occlusion coordination. Such cases do not necessarily develop periodontal disease. They must, of course, be regarded as having a potential traumatic occlusion, on account of probable deformity occurring as the result of functional misuse. But, in the absence of visible evidence of periodontal disease, there is seldom demand for adjustment from the standpoint of the prevention of disease.

The malocclusions to which I have referred are so numerous and occur in so many combinations that an attempt at enumeration is impractical. Let me only caution you not to disregard slight malpositions of the individual teeth or of the arches as a whole. Often a slight torsion of a single molar will produce a profound disbalance—to cite but one example, which is undoubtedly familiar to every dentist. When we add to the various malocclusions of the natural teeth, the professionally produced malrelationships induced by poorly balanced and incorrectly formed restorations, we have summed up the more common types that make for occlusal conditions which will probably result in periodontal disease.

The second question which we have propounded is:

## IS IT NECESSARY THAT VISIBLE DISEASE BE PRESENT TO CONFIRM A DIAGNOSIS OF TRAUMATIC OCCLUSION?

This question carries with it, by assumption, another question which may be stated as follows: Shall traumatic occlusion be corrected when discovered, in the absence of visible symptoms of disease?

There has been a time in the past when the answer to the former question would have been "yes." In other words, we have not until recently held that an occlusal condition was traumatic, until it had produced incipient disease, recognizable clinically. For some years, however, I have seen occasional cases in which no disease was present, as judged by standards then available, and yet exhibiting to me definite evidence of abnormality and indications that disease would ensue. In such cases, I have adjusted the occlusal relations and felt justified in doing so, because my experience has shown me how inevitable it would be that disease would show itself later. My conception of oral prophylaxis leads me to endeavor to remove all possible factors from the mouth which have shown themselves in other cases to be definitely pathogenic. I consider this form of treatment to have the greatest influence in the prevention of disease of any other single measure in oral prophylaxis.

When we study the recent work of Harold Keith Box on rarefying pericementitis fibrosa, we find histologic evidence of disease existing long before any clinical symptoms are observable. The process usually precedes infection in the gingiva; it precedes tooth mobility; neither is it discernible in the radiogram. We, thus, have revealed to us a truly startling state of affairs and one which leads us in search of a new diagnostic test. Either we must devise some means by which rarefying pericementitis fibrosa may be detected in the mouth at an earlier stage than is now possible, or we must remove its etiologic factors as far as we can determine them before any visible disease has manifested itself. When we realize that the most prominent, although perhaps not the sole cause of rarefying pericementitis fibrosa is traumatic occlusion, we feel amply justified in attempting to balance the occlusal relations wherever we find so marked a lack of harmony as to make it obvious that the patient cannot correct it by ordinary occlusal wear.

While it is a fact, as I have just pointed out, that we cannot detect rarefying pericementitis fibrosa by any clinical test at present available, we have, however, indications which point to its presence at a fairly early stage in its development. These indications have been collected by Dr. Box and are known as "The Twenty Signs of Incipient Periodontal Disease."\* These have already been published, but for your edification, I will enumerate them. (Practically all are symptomatic of traumatic occlusion):

*Sign No. 1. Traumatic Crescent.*—A crescent-shaped zone of abnormally deep color, never extending completely across the gingival border of the tooth and being confined as a rule to a segment about 1-6 of the circumference of the root. It may be superimposed over a mild generalized gingivitis, but frequently occurs in an otherwise healthy gingiva. It is considered to be

\*Bulletin No. 7.—Studies in Periodontal Pathology.—Canadian Dental Research Foundation.

a sign of a localized circulatory disturbance in the pericementum and is, as a rule, associated with traumatic occlusion.

*Sign No. 2. Congestion of Marginal Gingiva.*—This zone of congestion extends completely across the gingival border of the tooth. It is regarded as a sign of generalized pericemental circulatory disturbance. It is commonly found in cases exhibiting an end-to-end occlusion.

*Sign No. 3. Mobility No. 1.*—This is a degree of mobility so slight as to escape casual observation. It requires careful manipulation and the application of considerable digital pressure, in many instances, for its detection. It seems to be associated with rarefying pericementitis fibrosa, since, in this disease, varying numbers of the pericemental fibers have been replaced by this soft, yielding, new tissue.

*Sign No. 4. Recession of the Marginal Gingival Line.*—Taking the amelocemental junction as a fixed landmark, it is often found that the gingival margin shows an altered relationship to this line. In the average case, the margin of the gingiva is approximately two millimeters above the amelocemental line. Recession of the gingival margin toward this line is usually indicative of alveolar crest resorption. For example, a recession of the marginal gingiva which just exposes the amelocemental line will probably indicate a crest resorption of two millimeters. Exposure of the cementum will indicate an increased alveolar resorption of a corresponding degree.

*Sign No. 5. A Symmetric Recession of the Marginal Gingival Line.*—In many cases, recession of the gingival margin involves only part of the normal gingival line. This may occur in the median line of the tooth or on either side of this line, thus disturbing the normal symmetry of the curve of the gingival margin. It indicates a localized resorption of the alveolar crest.

*Sign No. 6. Recession of the Alveolar Crest Line.*—The crest of the alveolar process in the average normal case is approximately two millimeters below the amelocemental line, which has been adopted as a fixed landmark. Disturbance of the normal relationship between these lines is a manifestation of recession of the alveolar crest line. This may usually be detected by careful study of the radiogram.

*Sign No. 7. Increased Radiolucency of the Alveolar Crest or Lamina Dura.*—This is an indication of a rarefaction of the alveolar bone in these locations.

*Sign No. 8. Disturbance of Normal Contour of the Alveolar Crest.*—Frequently the alveolar crest presents in the radiogram a slightly eroded appearance, disturbing its characteristic normal symmetry. This is due to a localized resorption of the alveolar crest.

*Sign No. 9. Increased Widening of the Pericemental Space.*—When complete rarefaction of the lamina dura takes place, there is exhibited in the radiogram, in certain zones, a definite widening of the line which represents the pericemental space.

*Sign No. 10. Mobility No. 2.*—When the lamina dura is destroyed to any extent about the tooth, there is, of course, the tooth and the remaining alveolar wall. This naturally permits an increased mobility beyond the normal and beyond that designated as Mobility 1.

*Sign No. 11. Shortening of the Crest of the Septal Gingiva.*—When an appreciable resorption of the septal alveolar crest has occurred, there will usually take place a concomitant dropping away of the septal gingiva. This will be evidenced clinically by the appearance of spaces between the teeth which were formerly filled with gingival tissues.

*Sign No. 12. Linear Depressions in the Alveolar Mucosa.*—These lines are often better shown on models than in the mouth, but may usually be demonstrated in the mouth if the light is properly directed and the mucous membrane is dried. They extend parallel to the long axis of the root and overlie the septal bone. These depression lines are to be differentiated from the normal depressions between the alveoli of adjoining teeth. These lines are characterized by being sharply drawn.

*Sign No. 13. Stillman's Clefts.*—These are clefts occurring in the gingival border, occasionally in the center line of the tooth, but more commonly to one side of this line. Two clefts are frequently noted on the same tooth. Although the underlying tooth surface may not be visible, due to the apposition of the divided tissue, it is invariably possible to pass an instrument through any portion of the cleft to the tooth surface. The writer regards these clefts as essentially small pockets in which the ulcerative process has extended through to the labial surface of the gingiva.

*Sign No. 14. Absence of Stippling.*—In the normal gingiva the color is not a uniform pink, but presents a translucent stippled appearance of alternating spots of lighter and darker shades. When the normal gingiva is dried, it presents a somewhat velvety or mossy surface, indicative, apparently, of a normal circulation in the capillary loops. There is frequently observed a condition in which this mossy, stippled appearance is lost, and the surface is shiny, even when dried, and of a uniform color. The author considers this usually to be a sign of edema in the gingiva.

*Sign No. 15. Festoons.*—When, through the action of a certain grouping of etiologic factors, a hyperelasia of the marginal gingiva is induced, it is frequently manifested clinically by the occurrence of a linear depression outlining the marginal gingiva. The marginal gingiva presents a characteristic uniform thickening, which, however, in the early stages, does not involve the margin itself. In the early stages, too, there is no deviation from the normal color. McCall has called attention to the frequent relationship between these festoons and traumatic occlusion.

*Sign No. 16. Injection of Blood Vessels in the Marginal Gingiva.*—With the aid of an ordinary magnifying glass, there is to be seen, in many cases, a typical dilatation of the blood vessels in the gingival margin. This is to be considered as an indication of early infection in the marginal gingiva.

*Sign No. 17. Increased Depth of the Gingival Crevice.*—The normal gingival crevice measures in the average case approximately two millimeters. Any increase in its depth beyond this point must be regarded with suspicion. It is to be regarded as a sign of early pocket formation in the cemental gingiva. This lesion is to be detected only by the use of a suitable diagnostic probe.

*Sign No. 18. Epithelial Nodules.*—There are occasionally to be seen on the surface of the gingivae, small, slightly elevated nodules. They are of a lighter color than the surrounding tissue and in shape are usually round or oval. They usually indicate a period of long-standing venous congestion.

*Sign No. 19. Distended Veins in the Mucosa.*—In many cases there are to be observed dilated blood vessels of a purplish color, arising in the septal cemental gingiva and traceable for a considerable distance in the alveolar mucosa. They usually indicate the establishment of infection in the cemental gingiva at the base of the interproximal crevice.

*Sign No. 20. Pus Cells in the Crevicular Exudate.*—Frequently, when clinical signs of pus are lacking, and the gingival crevice is of normal depth, a microscopic examination of the crevicular fluid will reveal the presence of pus cells. This may safely be regarded as evidence of a suppurative gingivitis.

There may be some among you who will not agree with my recommendation that occlusal adjustment be made before clinical evidence of disease is apparent. Surely none will dispute, however, the dictum that traumatic occlusion should be corrected as soon as even one of these twenty signs appears. For many of these abnormalities have been definitely ascertained to be diagnostic of a fairly advanced state in the development of rarefying pericementitis fibrosa.

It may occur to you that I am developing my subject in a somewhat one-sided manner. But, unfortunately the subject of occlusion is too broad to cover acceptably in a single paper. It may be well to make it clear, however, that I hold convictions on the relationship of physiologic occlusion to the health of the teeth themselves, as well as of the peridontium. These beliefs have not been carried to a point, as yet, where I can support them with proof. I shall, therefore, make no extended comment on this phase of the subject. I can, however, speak with some authority on the relationship existing between traumatic occlusion and certain disturbances of the alveolar nerves and the dental pulp. My experience in this field has been rather extensive and entirely convincing.

I have often found mouths in which there was evidence of traumatic occlusion with, however, little or perhaps no clinical evidence of disease of the peridontium. But in these same mouths, there has been striking and usually painful manifestations of a disturbance in the nervous system of the parts. The simplest form is a pulpitis exhibiting undue sensitiveness to thermal changes. Neuralgia, in any of the branches of the fifth nerve may occur, even with symptoms of pain simulating tic douloureux. In a paper recently published, I described several of these cases and shall not take time here to discuss them.\* Since writing that paper, however, I have treated a case which illustrates the relationship of traumatic occlusion to this form of disease in a very striking manner. A description of this case follows:

Mr. G., aged sixty-seven years, presented with symptoms of tic douloureux on the right side of the face. Previous dental history was good. There was a generalized chronic infection of the gingivae but only two or three deep

\*"The Varied Reactions to Traumatic Occlusion."—Journal of American Dental Association, July 1924.

pockets. The general occlusal arrangement was good,—the teeth almost immune to caries. The patient had recently had two lower molars extracted in an effort to overcome his painful affliction, but without success. The pain was most severe in the region of the temporal bone. There was also tenderness to touch over the mental foramen, and at the right angle of the mouth. Spasm of the muscles was frequent. I found on examination that there was a slight traumatic occlusion throughout the mouth but without advanced periodontal disease on the lower right side. It was, however, the lower right first premolar and first molar to which the origin of his pain was referred. The radiogram failed to reveal any abnormality other than what appeared to be a calcific degeneration of the pulp of these teeth; there was no convincing evidence of pulpstones.

Treatment consisted of balancing the occlusion throughout the mouth, with especial relief and rest for the mandibular right first premolar and first molar. The result of the first treatment was practically a complete cessation of the "tic." There was a continuation of a slight dull intermittent pain referred to the mental region, gradually diminishing however, until at the end of six weeks, the patient reported entire comfort. The novelty and success of this treatment aroused considerable interest among the physicians whom the patient had consulted and who had previously agreed that only an injection of alcohol in the ganglia would give him relief.

Sensitiveness at the neck of the tooth and sensations usually interpreted by the patient as indicating cavity formation, are often due to traumatic occlusion. Were any of you to visit my office, you might be astonished to see the variety of abnormal conditions of the teeth and their supporting structures which are found to be attributable, in whole or in part, to traumatic occlusion. These cases are treated in large part by balancing the occlusal relation.

We now come to the third of our series of questions which was stated as follows:

ON WHAT SHALL A CHOICE OF METHOD OF TREATMENT BE BASED?

Much has been written and more has been said about the correction of the occlusion by grinding. It may be a new thought to some of you that I advocate any method of correction other than grinding. The traumatic occlusion hypothesis has often been attacked on the ground that correction was always achieved by grinding and that this necessarily caused mutilation. It may be well to note here that orthodontic treatment and the opening of the bite by means of restorations, are frequently indicated in the harmonizing of an occlusion. As to grinding, however, let me say that I have treated hundreds of cases in this manner, and I have had less than 1 per cent of cases in which the result was not happy. These misfortunes I attribute to my own mistakes of judgment rather than to an inherent defect in the method.

When grinding is the method of choice, it should be determined as nearly as possible at the outset, that the amount of grinding required will not be so great as to cause injury or visible deformity of the teeth. It is surprising, however, the extent to which grinding may be carried especially with the anterior teeth, without producing these results. Moreover, when this adjust-

ment is correctly done, there is invariably an improvement in function, and in appearance, which is most gratifying to both patient and operator. Let me give a word of caution, however. Do not attempt to balance an occlusion by grinding unless you are fairly sure at the outset that you will be able to carry it to completion without producing tooth deformity. A partially corrected case will be sure to bring disappointment to you and discomfort to your patient. Not only will the periodontal disease remain intractable, but the effect on the muscle habit of the individual and the nerve reflexes produced by a partially corrected occlusion is most unhappy. Much discomfort has been caused through failure to carry to completion the balancing of the occlusion.

What are the indications that grinding alone is contraindicated? First, come these cases in which there has been marked malocclusion throughout the lifetime of the patient. Especially those exhibiting extreme overbite or those having prognathism. Second, we find those cases in which several teeth have been missing for a period of years with resultant migration and elongation of the remaining teeth. Third, we classify those cases in which one or more of the teeth have a root inclination appreciably outside of the line of occlusal force. In these three groups of cases either orthodontic treatment or restorations, or both, will be required to provide normal function. In the third group, that containing teeth with abnormal root inclination, orthodontic treatment offers the only satisfactory result. When the age of a patient or other factors make orthodontia inadvisable, such teeth not infrequently have to be extracted rather than treated.

At first blush, the moving of the teeth suffering from periodontal disease by orthodontic appliances might appear to be exchanging insult for injury. It would seem that orthodontic treatment would merely become an exchange of burdens for teeth which had recently been receiving excessive stress. As a matter of fact, it has been my observation that in these cases, the orthodontic appliance actually provides an appreciable stimulating and stabilizing support. It seems to have a decidedly stimulating effect upon cell proliferation as observed in the healing processes. The not infrequent inflammation which follows the application of orthodontic force, in the case of previously normal teeth, seems not to occur in those having periodontal disease, at least not to the same degree.

In those groups of cases in which it is decided that the bite must be opened by means of prosthetic restorations, and this type is numerically large, the first requisite is to determine the extent to which this should be carried. The requirement is for that degree of "opening" which will permit the full use of the jaws in their various excursive movements without continuing the excessive stress on individual teeth. The limitation of this procedure is to be found in the effect it has upon the temporomandibular joint. Let me here pay tribute to George Monson and his coworkers who have done pioneer work in the measurement and predetermination of the intermaxillary relations. Their work was undertaken largely as a means of perfecting prosthodontia, but its influence is reaching out in every branch of dentistry. Peri-

dontists have reason to be grateful for this assistance in a most complicated and difficult field of research.

Whether we make use of orthodontia or of prosthodontia, or both, it will always be necessary to make the finer adjustments of occlusion in the mouth with the carborundum stone. For no appliance or instrument can be adjusted with such accuracy that it will bring about that requisite coordination of occlusal surfaces which is requisite for health.

This brings us to the point suggested by the fourth of our series of questions. The proposition is stated as follows:

HOW SHALL WE DETERMINE WHEN TRAUMATIC OCCLUSION HAS BEEN  
ENTIRELY RELIEVED?

It has been my observation that some dentists have attempted to treat periodontal disease by grinding and have failed to secure the desired results. Examination of these cases usually reveals the fact that the grinding which was undertaken had not been carried far enough to actually correct the occlusal disharmony. This weakness in the results of treatment arises from a combination of caution and timidity inherent in the individual. Possession of these qualities in a marked degree has ruined the possibility of developing many otherwise successful surgeons. It is to be regretted from the standpoint of both patient and dentist that this occurs. And, I shall be most happy if I accomplish nothing more than to point out a means by which my colleagues may more satisfactorily accomplish that which many of them know their patients require.

When correction of occlusion is undertaken for a case in which a visible inflammatory reaction has become established, the contour and color of the gingivae and the firmness of the tooth provide a reliable guide. It is but logical to assume that the removal of the factor which was principally responsible for the occurrence of the inflammation would be followed by the relief of the inflammatory symptoms. And, it is a fact that such a change does take place. The reaction is invariable, providing the relief of the traumatic occlusion is complete and the other factors in etiology have been satisfied. Teeth which have been loose regain their firmness in a surprising short time, providing there is no periapical disease present in the tooth. An improvement in color, texture and contour follow the vascular reaction. Failure to secure these results is definite proof that the occlusion is still traumatic.

In those cases which are selected for the adjustment of occlusion and which show no pathologic coloration of the gingival tissue and no mobility of the tooth, we are forced to depend largely upon subjective symptoms. If the patient has complained of pain or other discomfort which is attributed to an occlusal incoordination, we must use the relief of these symptoms as our guide. Furthermore, the tactile sense of the pericementum may be invoked as an aid in occlusal adjustment in many cases. It is seldom that a patient will fail to give aid in pointing out those teeth which are out of occlusal balance. Such directions from the patient are of the greatest assistance in making those finer adjustments which mark the completion of this part of periodontic treatment. As the operator approaches the ultimate in his ability

to detect remaining discrepancies in the occlusal relations, the patient's reception of these discrepancies becomes more acute. It would seem that the pericemental sensibility becomes accentuated with the approach to a condition of occlusal harmony.

There remains one more question to which we seek the answer:

HOW MAY WE DETERMINE WHETHER A CORRECTED TRAUMATIC OCCLUSION  
HAS RECURRED?

This question assumes an affirmative answer to the query as to whether traumatic occlusion does recur. I have previously compared the teeth and jaws to a finely adjusted mechanism. In any machine, such as the automobile, we sooner or later find wear and deformity of the moving parts. This occurs irrespective of the care with which the initial adjustment of the parts is made, although it occurs more rapidly where this adjustment is faulty. In the mouth, likewise, we find wear taking place and we know that adjustment is required because of the fact that occlusal wear is never entirely uniform and symmetrical. When traumatic occlusion has developed and has been corrected, the resulting condition cannot be expected to remain stationary for the reasons just stated. Furthermore, when we adjust the occlusion of a tooth which has been loose, the very fact of the previous absorption of bone which never is and never can be entirely regenerated, predicates a continuing sub-normal alveolar support. In such a case, future wear will not occur as rapidly as upon a tooth which is or has been entirely firm. We should always keep in mind the certainty that occlusal wear will continue just so long as correct function is maintained.

The detection of a recurrent traumatic occlusion is accomplished simply by noting the recurrence of the original symptoms of disease. It is only necessary to exclude other factors which are capable of influencing recurrence, chief among which will be deposits of calculus, vascular changes in the periodontium and the physiologic integrity of the dental pulp. The presence of these etiologic factors of themselves is, however, very commonly an indication of the recurrence of traumatic occlusion.

The hypothesis which I submit here appears to me to be so simple as to be self-evident. I would urge that in the continuing care of mouths which have been treated for periodontal disease, true prophylaxis demands frequent inspection of the mouth from the standpoint of the mechanism of the occlusion. For adjustments will be needed from time to time in every mouth and only when proper attention to this branch of the work is given, will we live up to our responsibility.

When we study the incidence of periodontal disease from the standpoint of traumatic occlusion as a causative factor, we find the various theories of etiology harmonizing themselves almost without effort around this focal point. For instance: when we see a tooth suffering from a deep periodontal lesion, and an adjoining tooth with a nearly normal periodontium; when we see disease occurring on one side of the mouth while the opposite side is practically healthy; and when we find unmistakable evidence of traumatic occlusion only at the point of occurrence of the disease, the most skeptical must

be convinced that the traumatic occlusion plays a major part and systemic factors a very minor part in the production of this form of disease. The simplification of this problem is most gratifying to him who will study and approach the subject through the avenue of the occlusion. Further elucidation of this problem must come through the study of the minute anatomy, viz.,—histopathology and we may look with confidence and hope toward the researches of Box for the final answer in this field of endeavor.

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PREVENTIVE ORTHODONTIA FOR THE GENERAL PRACTITIONER\*

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BY G. VERNON FISK, D.D.S., TORONTO

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IN a paper read before the Academy of Stomatology, Philadelphia, in April, 1916, entitled "The Prevention of Malocclusion," Dr. J. Lowe Young states: "That prevention is preferable to cure is conceded by all who possess the true professional spirit. Thus, it would seem to be the duty of the dental profession to prevent malocclusion in the rising generation." In adopting this policy, one of the most vital questions for the practitioner to determine, is the time when it first becomes evident that the development of the dental arches is not taking place normally. Experience has shown that this is very often prior to the time of the eruption of the permanent teeth.

As you are aware, the twenty deciduous teeth under normal conditions are erupted in contact with each other at the age of three years and, in the vast majority of cases, occlude properly. The question, therefore, naturally arises, why is it that so many cases later develop malocclusion? It is now recognized as an established fact that many cases of malocclusion, a large number of which result in impaired dentofacial development, are caused directly through habits.

HABITS

Habits of diet may be considered amongst the most important factors in the prevention of malocclusion and in assisting the normal growth of the jaws. For example, lack of vigorous mastication results in insufficient exercise to the masticatory muscles to stimulate the proper development of the jaw bones. It follows, then, that the daily food supply should provide an amount of coarse, fibrous food suited to the age of the child and that the child should be trained from infancy in habits of thorough mastication. If these desirable masticatory habits are formed during the early growing years, the forces thus repeatedly exerted upon the mandible and maxilla will result in the required normal growth, provided no other undesirable factors intervene.

In childhood, probably the most common habit affecting jaw development is mouth-breathing. This may be due to the presence of adenoids, enlarged or diseased tonsils, or nasal obstruction. Consequently, it is of great

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\*A clinic presented at the Academy of Dentistry, Toronto, February 18, 1925.  
Reprinted from *Oral Health*, May, 1925.

importance that the general practitioner should be able to determine from the appearance of the lips whether or not the patient is a mouth-breather or has a tendency to unconsciously allow the lips to remain apart. Simple methods of diagnosing this condition are:—(1) If there is a puckering or strain of the muscles over the symphysis when the lips are closed, the operator can be reasonably sure that they are not habitually closed together when relaxed. (2) By observing the relative habitual position of the lips of the patient when relaxed. (3) By the operator momentarily separating the lips with the fingers and then allowing them to assume a position of rest.

The first essential in methods of treatment necessitates the removal of the cause of the mouth-breathing. If there seems a possibility of its being due to nasal or pharyngeal stenosis, the patient should be referred to a rhinologist. For, if the possible cause of malocclusion is uncorrected, there is little chance of the successful preventive orthodontic treatment of the case. Following the removal of the cause, patients should be taught to become constant, normal breathers by repeatedly reminding them to keep the lips closed during the daytime and by having them wear at night, if necessary, plasters of surgeons' silk isinglass. These may be prepared by cutting the material into strips about one-quarter of an inch wide and two and one-half inches long. To apply, moisten two of these and place crosswise over the lips after they have been closed. (Plasters will thus be placed in the form of a letter x.) In the morning, soak the plaster with warm water and it will peel off readily. This treatment should be accompanied by instruction in exercises to promote development of the lip muscles, particularly the orbicularis oris.\*

The preventive practitioner is also alert in observing the presence of other detrimental habits which must be corrected early, so that their effect upon the teeth is not cumulative. Of these, continued thumb sucking produces narrowing of the dental arches and prominence of the upper anterior teeth, persistent resting of the chin upon one hand causes a shift of the mandible, or resting the chin upon both hands results in a "close bite" or retroversion of the mandible; whilst to the biting of lips, nails or cheeks, may also be ascribed various forms of malocclusion. Further, such habits as sleeping in unnatural positions (for example, with the head upon the arm, or chin resting upon the hand), the frequent use of the pacifier and tongue sucking manifest their ill effect each in a specific manner toward malocclusion, and the practitioner must advise to suit the necessity of the case.

#### ENLARGED TONSILS

By careful observation of the throats of his patients, the general practitioner may become quite proficient in detecting conditions such as enlarged tonsils. Abnormal tonsils may produce protrusion of the mandible through the influence of a large tongue, which usually accompanies this condition. Many cases of this type of malocclusion (Class III. Angle) may be prevented by the early removal of the tonsils. Only recently, a mother upon consulting her dentist regarding the prominence of the mandibular jaw of her four-year-

\*International Journal of Orthodontia, Oral Surgery and Radiography, February, 1924; also previous papers on "Muscle Training" by Dr. Alfred P. Rogers.

old daughter, was advised to wait until all the permanent teeth had erupted, when the condition would naturally be righted. As a result, instead of a short period of corrective work now, the child may later require prolonged orthodontic treatment.

#### PREMATURE LOSS AND PROLONGED RETENTION OF DECIDUOUS TEETH

The retention of every deciduous tooth until just prior to the time of eruption of its permanent successor is another preventive of malocclusion.

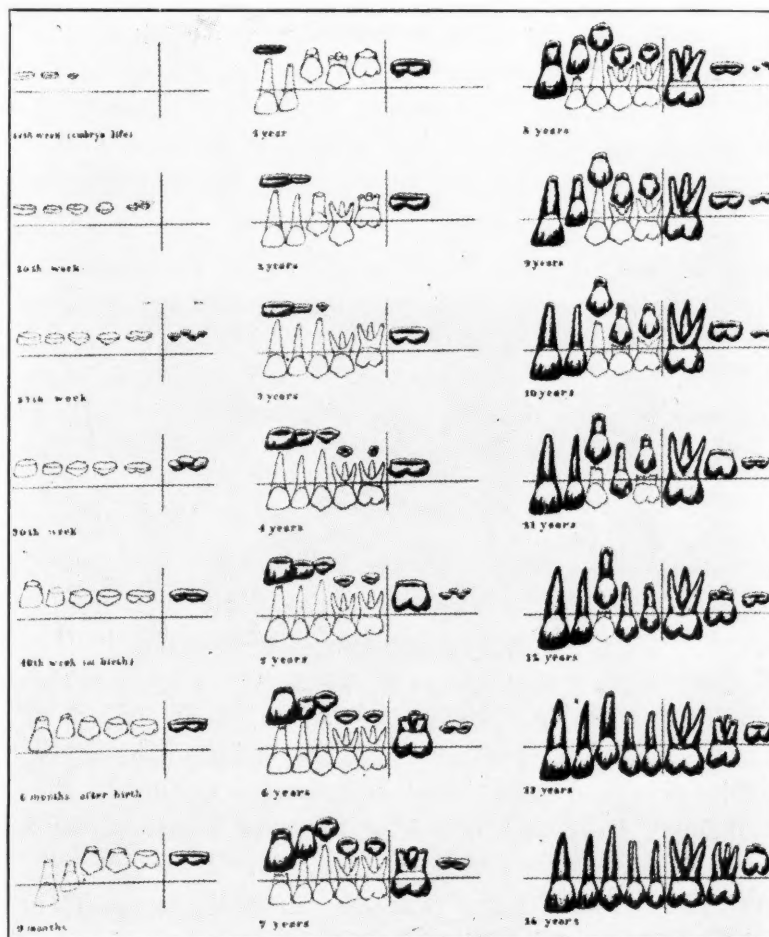


Chart prepared by W. J. Brady, D.D.S., Kansas City, Mo.

For, when a deciduous tooth is lost prematurely without maintaining the space it occupied, the remaining teeth shift so that the permanent successor may be crowded either buccally or lingually. When the premature extraction of a deciduous molar is necessary, the space should be maintained by inserting a little splint made by placing a band on the tooth mesial and distal to the space, and joining the two bands by a piece of heavy wire. A drifting forward of the first permanent molars may also be caused by such a neglect of the deciduous teeth that the mesiodistal diameter is lessened as a result of caries. Hence all cavities in deciduous molars and cuspids should be filled

with metallic restorations and the original mesiodistal width of the tooth reestablished.

The accompanying chart shows the average age of commencement of calcification, eruptions and loss of the deciduous teeth and the average age of the eruption of their permanent successors.

On the other hand, prolonged retention of a deciduous tooth may also prove a factor in producing malocclusion. Radiograms should be taken before the removal of such a tooth, to make sure that the permanent successor is present. When the permanent tooth is then shown to be developing, its deciduous predecessor should be removed if retained beyond its normal time. If the absence of a permanent tooth is revealed the deciduous tooth may be allowed to remain, and will, in some cases, render service for a few years. It is today considered better practice, however, to remove the deciduous tooth, then move the teeth posterior to the space forward, thus avoiding the necessity of artificial replacement later on in life. For example, in cases where the first permanent molar is lost as a result of pathology and the third molar is impacted, the second molar may be moved into the space normally occupied by the first molar, thus relieving the impaction and allowing the third molar to erupt into the position of the second. This readjustment should be attempted only by a specialist or general practitioner who has fitted himself by careful observation and study of the subject of orthodontia.

#### OVERBITE

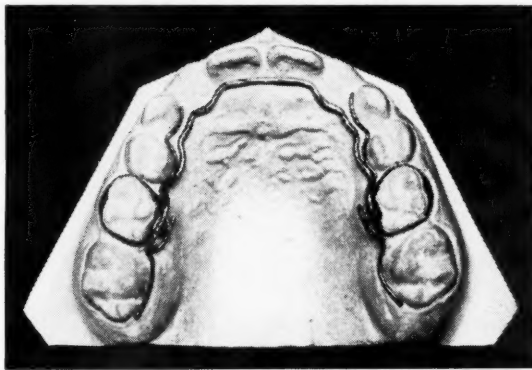
Again, a deciduous tooth may also be removed provided there is evidence of a permanent successor in a case where the deciduous tooth has become ankylosed to the bone. It is, thus, prevented in erupting to the line of occlusion, and contributes to a condition of arrested vertical development in the premolar and molar region. Hence arises the likelihood of an overbite. Hindrance to the complete eruption of the posterior teeth may also be provided by habits previously mentioned, namely, the resting of the chin upon one or both hands. Here, again, lack of thorough mastication plays an important part, as it may prove a causative factor in "close-bite" by insufficient vertical development of the bone. Parents and patients should be informed by the dentist of the possible effect of continuing such habits and instructed in overcoming them.

#### NORMAL RESTORATIONS

The importance of restoring normal size and form to lost tooth tissue should be emphasized in relation to the prevention of malocclusion. If an inlay or filling is too wide or too narrow mesiodistally, disturbance of the alignment of the teeth results, and normal occlusion is affected. If the fillings are overfull and are thus subjected to increased strain, the teeth bearing these fillings and their opponents are liable to be depressed in their sockets, or to otherwise change their position by "traumatic torque," with probable periodontal involvement.

## PREVENTIVE MEASURES

It should, therefore, be the endeavor of every dentist conducting a family practice to interview the children of three years and over and to make careful examination and records. From these he can base his recommendations and advise regarding habit formations and preventive measures to be followed. It should be his duty to see that all carious teeth are filled, and, if the cusps of the opposing teeth are not in correct relation, they should be made so either by himself or someone competent to render such treatment. A valuable record of every case may be obtained by taking impressions each year, and from these making casts so that the progress of development may be studied from the lingual as well as the buccal aspect. From such a collection indisputable facts may be gathered. Even in those cases where the deciduous teeth seem quite regular in their alignment, if spacing sufficient to accommodate the permanent successors does not naturally develop between the six anterior teeth from the ages of three and one-half to five and one-half years, special orthodontic treatment should be rendered as a prevention to



Illustrates a cast of the maxillary teeth of a little girl seven and one-half years of age. The lingual arch conformed to the surfaces of the teeth in their original positions. The expansion gained by the auxiliary springs of .020 wire in the deciduous canine and first molar region is shown by the amount of space between the springs and the arch. Extensions of .022 wire for expanding the first permanent molars are also shown.

irregular eruption of the permanent teeth. The late Dr. E. A. Bogue suggested a relationship between the mesiodistal diameters of the crowns of the deciduous and permanent teeth. By measuring the six anterior deciduous teeth and adding one-fifth of the measurement of the combined widths an estimation of the approximate mesiodistal widths of the permanent successors may be made. In this way the size of the permanent denture can be predetermined by using the Bonwill system described in Dr. Pullen's chapter on "Orthodontia," published in Johnson's textbook of *Operative Dentistry*.

The lingual arch of .036" arch wire with auxiliary springs of .020" S.S.W. cold-drawn wire soldered to it well back toward the second deciduous molar anchorage is the ideal appliance for stimulating the development of the deciduous denture. The arch is attached to the molar bands by means of half-round vertical tubes (D.L. 8, made by the J. M. Ney Co.), which may be obtained from the Dental Supply Depot. These are placed upon the lingual surface of the molar bands, and an accurate fitting piece of half-round posting

soldered to the arch wire, to engage the tubes on the bands. Locks are soldered gingivally at right angles to the arch wire, either at the mesial or distal, and bent so as to pass horizontally along the gingival of the tube when the arch is placed in position. This assures the appliance remaining in position. The light springs are adjusted to carry the molars and canines buccally. In addition, it is usually necessary to expand the anchor teeth as well, care being taken to avoid rotating these teeth. When the first permanent molars erupt too far lingually, light springs may be soldered to the main arch extending distally and adjusted to carry the erupting first molars buccally. The construction of the appliance is covered in a paper by Dr. John V. Mershon, entitled "The Removable Lingual Arch and Its Relation to the Orthodontic Problem," and published in the *Dental Cosmos*, 1920, pages 693-704.

Upon every side one hears the present heralded as the era of prevention. This is not limited to the province of dentistry alone, but applies to all branches of medicine as well. It is during childhood that the greatest opportunities for prevention are presented. Nowhere is this truth more applicable than to the field of Preventive Orthodontia. It is, therefore, our obligation to place before the parents of growing children such knowledge as we may possess, in order that the "ounce of prevention" may be applied during the formative period, when many life habits are established.

## CASE REPORT\*

BY PERCY NORMAN WILLIAMS, D.D.S., NEW YORK CITY, N. Y.

IN showing this case I am hoping that I may stimulate your interest in diagnosis and a consideration of the changes in temporomandibular articulation.

In considering this case as it was at the time when the patient was presented, the important question arose in my mind, is there efficient occlusal arrangement of the teeth other than normal occlusion? Is it possible to undertake orthodontic treatment for the purpose of improving masticating efficiency and stop short of normal occlusion and yet consider the case a success?

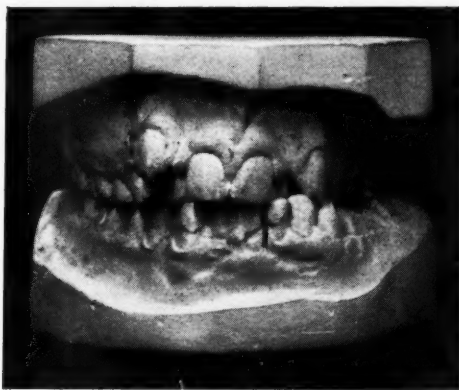


Fig. 1.

Orthodox teaching seems to indicate that when all the teeth are present, unless conditions are favorable for obtaining normal occlusion, we are not justified in undertaking treatment. Of course, one of the chief obstacles of stopping treatment before normal occlusion is attained is the question of retention; but if the treatment is undertaken sufficiently early in life, I believe that even though there are many factors of a discouraging nature, we may yet be called upon to improve masticating efficiency when normal occlusion seems to be a remote possibility.

This was the important question which confronted me when considering this case. There were many discouraging factors, and I hesitated and gave the matter very careful consideration before undertaking treatment. I accepted the case with the belief that I could improve the arrangement of the teeth, which would result in greater masticating efficiency. I did not offer any encouragement that a complete restoration of the mandible to its normal relation to the skull could be brought about.

\*Read before the New York Society of Orthodontists, New York City, December 10, 1924.

I was mindful of the difficulties in retention and this was also carefully considered.

Fig. 1 shows the relation of models at the time work was undertaken.

Observe that the median line in the mandibular arch bites about three-eighths of an inch to the left of the maxillary. At first glance this seems to be due to a shifting of the mandible to the left in the arc of a circle with the left condyle as the center.

In Fig. 2 the broken outline on these charts indicates the arrangement of the teeth at the time the work was begun; the continuous black line indicates our conception of the normal arrangement.

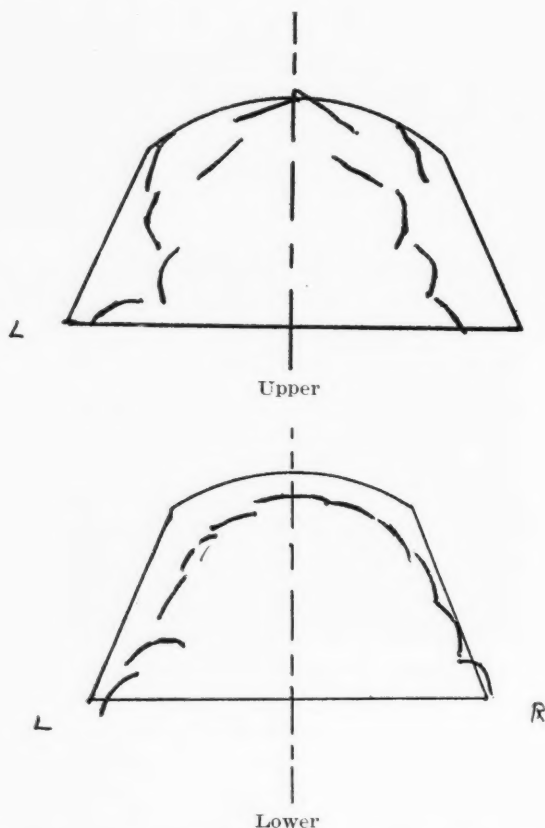


Fig. 2.—Mandibular arch. Inner line shows teeth at beginning of treatment. Outer line normal arrangement.

In examining the maxillary jaw we observe marked arrested development throughout the entire upper arch (Fig. 3). In the mandible the molar on the right side is approximating its normal position. If we refer to the relation of the mandibular model to the maxillary, we will observe that the teeth on the right side approximate normal position (Fig. 4), mesio-distally. On the left there is distal occlusion (Fig. 5). I believe the mandible has been displaced bodily to the left, the amount indicated as shown in comparing the median line on the mandibular model with the maxillary (Fig. 1). In all probability this has been brought about by the forces of occlusion. A displacement of the teeth in the alveolar process of the mandible will not account for the marked disturbance of the median line.

After predetermining the positions that the teeth should occupy normally in the maxillary and mandibular arches, in order to bring the mandible in its normal relation with the maxilla, a bodily movement to the right is indicated as shown on the mandibular record card, Fig. 6. When we consider the mobility of the mandible and the extremes to which it may be displaced, we might describe it as an anatomic structure retained by ligaments and moved by muscles, its position when the jaws are closed is dependent upon the inclined planes of the teeth, principally of the maxillary arch; without the teeth we will say that the mandible has no fixed position.



Upper

Fig. 3.

Lower

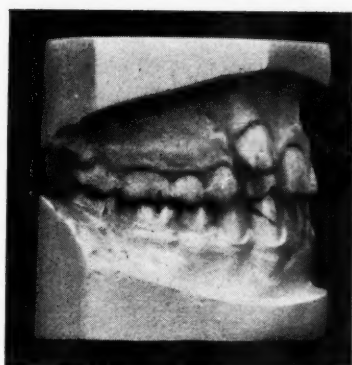


Fig. 4.

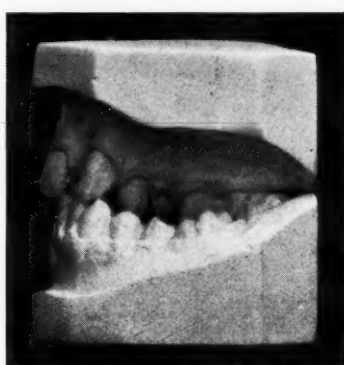


Fig. 5.

Considering this definition of the mandible to be a fact, we can, by a simple process of deduction, state that if the teeth are in normal occlusion and the entire maxillary arch were moved as a whole to the left three-eighths of an inch and the movement were done in a way to conform to biologic laws, and at a time in the child's life when conditions were favorable for tooth movement, then the mandible would follow the maxillary arch and become displaced. This conception of the mandible offered a working hypothesis for treating this case. With faith in this hypothesis as the only means for successful treatment, I accepted the case and began treatment December 2, 1919.

The case other than showing expansion, displayed little improvement with relation to the mandible at the end of the first year. At the end of a year and a half there seemed to be no fixed bite and the patient was able to cause a

still greater displacement of the mandible with apparently no effort. This seemed a little discouraging but we felt we should go on with our original plan of treatment. Gradually the median line began to improve until the buccal cusps of the molars and premolars on the left side were biting end to end. From that time until it was necessary to discontinue treatment, the case steadily improved.

We greatly regret that we were unable to go on with the case and obtain normal occlusion when the goal seemed to be in sight. However, we had to

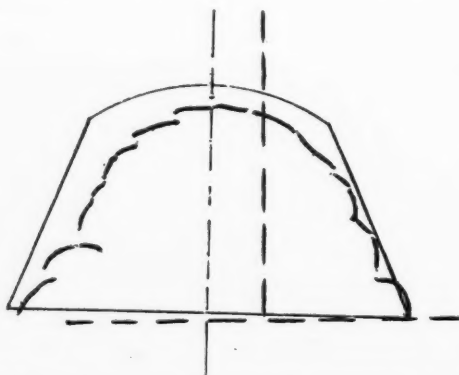


Fig. 6.—Straight perforated lines indicate movement necessary to bring mandible in normal relation with maxillary arch.

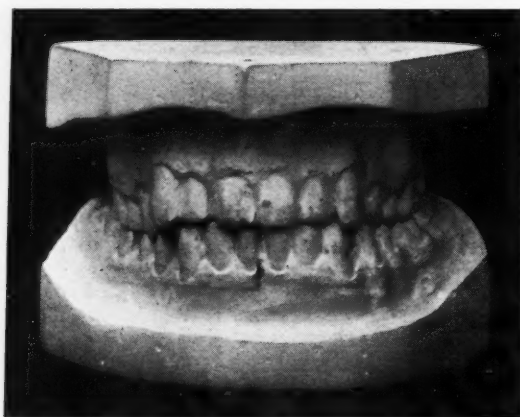


Fig. 7.



Fig. 7.

accept conditions as they were and these necessitated discontinuing treatment. We inserted retention appliances, and at the end of three months the patient lost the maxillary retention plate and did not report to the office until four months later.

The models, Fig. 7, show the condition at that time. The median line approximates normal, masticating efficiency has been restored. The left side which was formerly useless is now approximately normal (Fig. 8). There has been considerable improvement in the plane of occlusion (Fig. 9).

The interesting part of the question now arises as to what changes have taken place other than a movement of the teeth. I am convinced that a correction of the median line has been brought about by a movement of the mandible. Did this change in the mandible occur near the angle, in the ramus, or at the condyle? I have discussed this case with some members of

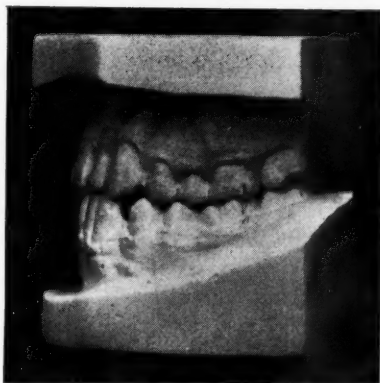


Fig. 8.

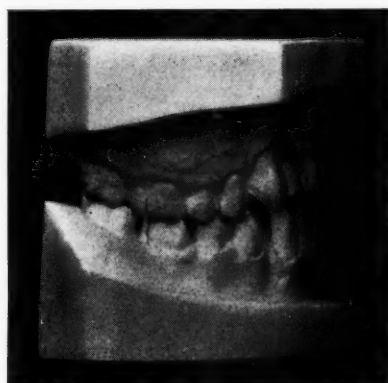


Fig. 9.

our profession and there seems to be a difference of opinion. Dr. Jackson has stated before this society that in cases where distal occlusion has been corrected a change has been brought about at the angle, but the movement in this case was not mesiodistal but lateral. I am inclined to accept Dr. Jackson's opinion as being an explanation of the mandibular changes in this case. I do not see how such an extensive movement could take place at the condyles. I would be grateful for an expression of opinion from members of this society.

In closing I wish to say that I believe that our society is greatly in need of facilities for doing research work to study changes in the temporomandibular articulation. Experiments could be performed upon some of the lower animals, dogs, monkeys and rabbits, for studying mandibular displacement. I believe that sooner or later this must be brought about. I suggest that the society at some future date give this consideration.

## ROOT MOVEMENT AND BONE DEVELOPMENT\*

By T. M. ROBERTSON, B.S., D.D.S., COFFEYVILLE, KANSAS

I HAVE four or five cases in my practice requiring considerable root movement and bone development that I wish to show my method of handling. I may be right, possibly wrong.

**Radiogram.** This is a radiogram of a child a little less than four years of age, showing the position of the temporary teeth and the permanent teeth. In handling all of our cases, it is a good thing to keep in mind, the normal conditions that are in process of change all during the period of growth.

In Fig. 1, the lower working models are all the same case. You will note the change with the elevation of the molar tooth in each model and the slight

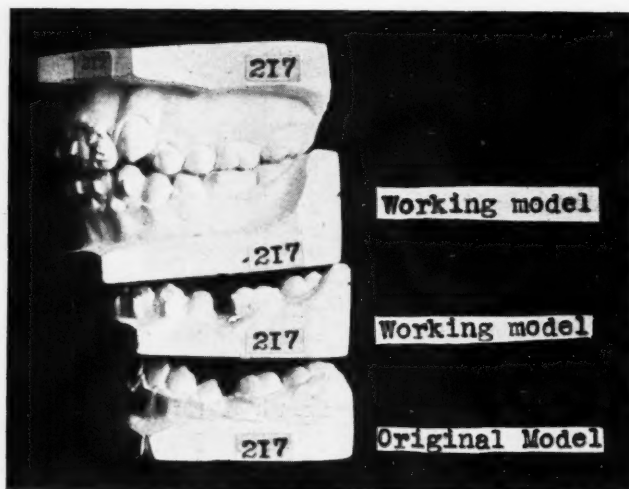


Fig. 1.

depression of the anterior teeth. There is an impacted premolar in this region. There is also probably a gradual change in the shape of the mandible.

Fig. 2 is another picture of the same case, showing the position of the impacted premolar. Here it is in position. This was taken about two years later than the first.

This is a case of a person a little older than we like to handle, but we have to take them as they come into the office. This is a case at the age of twenty-three. There is a lingual eruption of the anterior maxillary teeth. Here they are brought to position. We cannot expect to get the harmony of face after the abnormal anatomic changes have established pathologic conditions in the respiratory tract.

\*Case report, read before the American Society of Orthodontists, Kansas City, Mo., March 18 to 21, 1924.

Some of the illustrations referred to in this article were not obtainable.



Fig. x, 1.

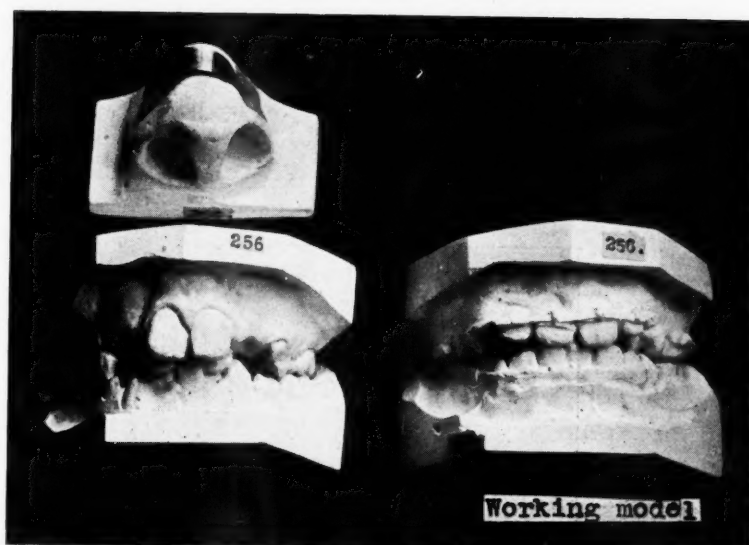


Fig. 3.

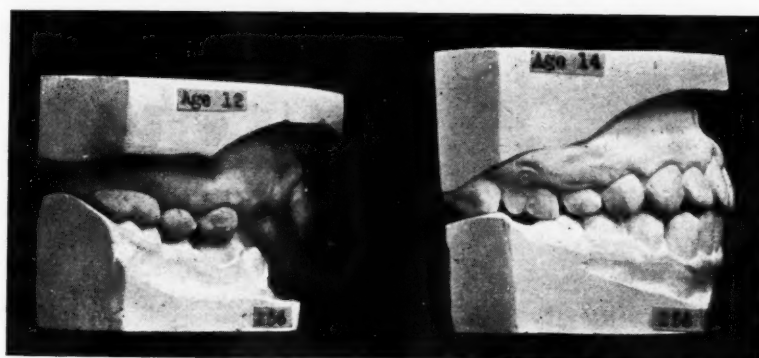


Fig. 4.

Fig. 4.

Fig. x, 1. This is a case I am working on at present, a working model. This person is twenty-four years of age. This is the position we found at a little past twenty-two years of age, a bad disfigurement. The mental effect in this girl's case was quite marked. She is a stenographer. She always took a job in the back office where it would not be necessary for her to meet the public. At this period in the correction (nearly two years later) she has

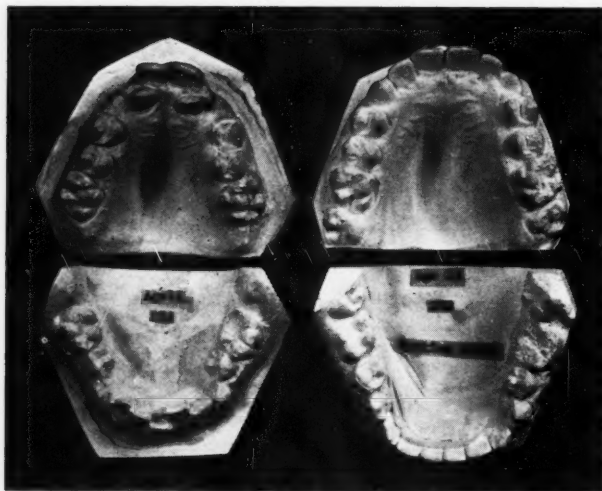


Fig. 5.

Fig. 5.



Fig. 6.—Profile of patient, models of which case are shown in Figs. 3, 4 and 5, made two years after first model was made.

taken a position in the front office. Her improvement in mental attitude is very pronounced. She has acquired a diamond ring during the period and I think with the progress of the case, I can report still better results next year.

The same case, an anterior view, aged twenty-four. A working model.

In Figs. 3 and 4 is shown a malnourished, rachitic case. There had been an ill-advised operation at about seven or eight years of age resulting in a collapsed naris. I have dilated the nose to show an appliance I have had the child wear while sleeping. It is a light spring about the consistency prob-

ably of heavy molar band material which the child applies to the side of the nose at night with (physicians' and surgeons') court-plaster. This gives him free access of air during the sleeping period. Of course, it is out of the question for him to wear it at school.

In Figs. 5 and 6, the laterals were erupted lingually to the centrals in both cases, practically directly back of the centrals. This is a case I think

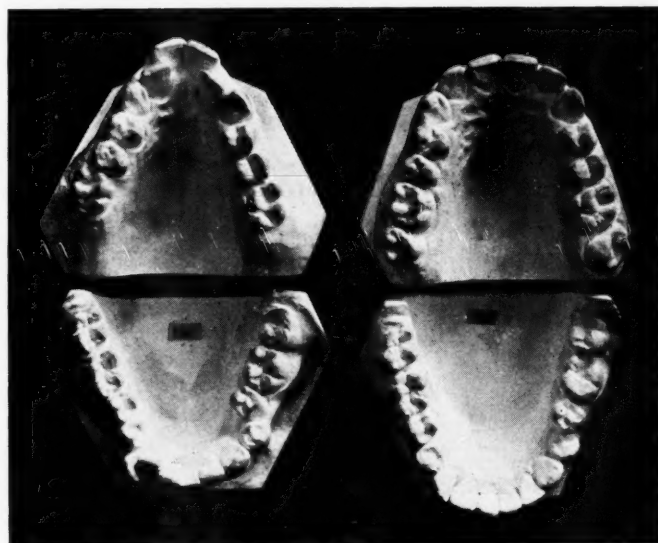


Fig. 7.



Fig. 8.

will show more or less bone absorption and growth, due to the fact that the laterals moved from directly back of the centrals out to the front. It is not entirely a case of springing of the plates in this case.

This is the same case, showing the position of the laterals at the age of twelve and fourteen. The case is not quite finished yet.

This is the same case, a side view. It will show the molars are practically in position, or nearly so, showing the growth or change has been made

between this point and this one (development anterior to the molar). This is a case where there was a great deal of lack of development. It was an arrested case of tuberculosis, that had been running a slight fever up to a couple of months before I started the work. The child is a very good subject to work on. I get plenty of cooperation in this case. He will eat anything I tell him. At one time he was drinking an extra quart of milk and was showing a gain, for three or four weeks, of a pound a week. The gain since that time has not been quite so marked. He was drinking goat's milk at the time he made the greatest increase, so he gives the goat's milk the credit. I think cow's milk would have done the same. He was at the point

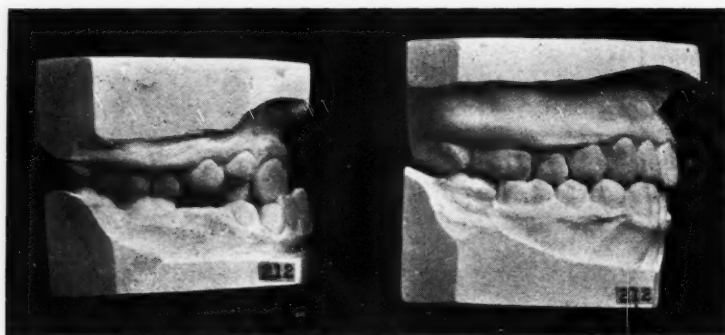


Fig. 9.

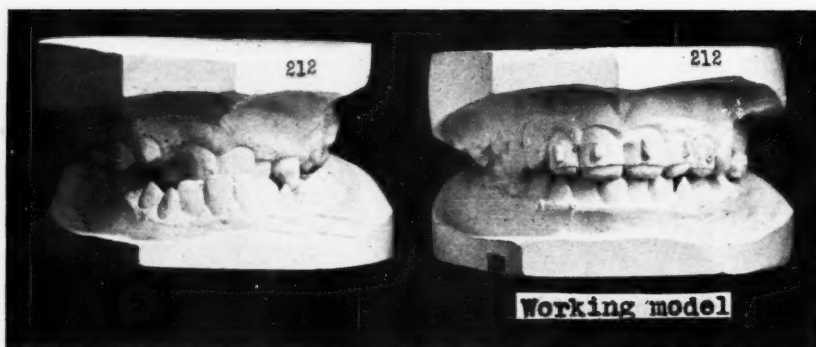


Fig. 10.

where he was in a position to make a rapid gain. He had not made much improvement before that time.

Fig. 6 is a picture of the individual at present, taken two years after the first model was made. The laterals are in position, as you will notice.

Fig. 7. A very narrow arch; development occurring eighteen months later. It is practically in position. The retainer was kept on a short time after that.

Side view of the same case. Some slight movement of the mandible forward.

Fig. 8 is another case, aged twelve and fourteen. The anterior maxillary teeth had erupted lingually to their normal position. There is the point of the canine, if you can see it. There was a distance of about five millimeters

of development lingually to the normal position at that age. These were moved bodily forward, as you see.

Fig. 9 is a side view of the same case, showing the development was nearly entirely from between the molar region and in the anterior portion of the process.



Fig. 11.

Fig. 10 shows the same case, front view. Note the interlocking of the maxillary anterior teeth to the mandibular.

Fig. 11 is the case at present.

**DEPARTMENT OF**  
**ORAL SURGERY, ORAL PATHOLOGY**  
**AND SURGICAL ORTHODONTIA**

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**FURTHER OBSERVATIONS ON THE CONTROL OF POSTOPERATIVE  
DENTAL PAINS\***

BY ROBERT FRIEDMAN, D.D.S., NEW YORK

IN the January, 1925, issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY, AND RADIOGRAPHY I reported on the various causes of postoperative pains. Among these I cited the use of nonisotonic solutions and adrenalin as being prominent etiologic factors. In a recent paper in *Dental Cosmos* on "Local Anesthesia Reviewed," I gave, what to my mind seems to be the best method of preparing anesthetic solutions. Therein I advised the use of adrenalin in the smallest possible quantities.

Undoubtedly, with every precaution taken, there are times when the causes for postoperative pains cannot be avoided. At such times it is necessary to use either sedatives or hypnotics. It has long been felt that any drug, capable of producing these effects without the dangers of narcotic action, should be utilized.

Since the discovery in 1903 of barbital and diethylbarbituric acid, there has been a steady increase in the use of this group of drug. They are gradually replacing in a measure the older ones of the hypnotic series. They are known as the barvital preparations and are usually sold under the trade name of veronal or luminal. From the inception of their use until the present time these were considered to be harmless, in so far as fatal after-results might manifest themselves. But a short time ago there were several papers published in the medical press controverting this belief. ("Barbital Poisoning" by William H. Leake, M.D., and E. Richmond Ware, M.D.; also "Barbital and Unessential Modifications," Jour. Am. Med. Assn., lxxxiv, No. 6.)

The average minimal dose of these drugs is believed to be 50 grains. It is not necessary that this amount be taken in one dose to produce such a

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result. Barbitol and its derivatives are eliminated very slowly, remaining in the system for three or four days after ingestion. The cumulative effects become evident if taken continually. Therefore, 50 grains should be the maximum amount prescribed to any; best to order a cathartic and diuretic eliminant so as to aid the organism in successfully discarding these drugs.

Among the diverse barbitol preparations there is one that I should like to comment upon. It is allonal. I wish to recall that I have prescribed allonal in many cases without any untoward symptoms. It consists of allyl isopropylbarbituric acid with aminopyrin, known commercially as pyramidon. Since the publication of the previous paper in the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, I have prescribed this preparation in over one hundred cases requiring some form of sedative or hypnotic medication. Every report was favorable. In the cases of young children from eight to twelve years of age, one tablet containing  $2\frac{2}{3}$  grains always produced sleep for a period of eight hours or longer. In older individuals two such tablets usually produced the same results. No habit forming or intoxicating effects have yet been noticed. When directing the use of this drug, I always emphasize the need of ingesting the smallest quantity essential to relief. I enjoin the use of this or any other drug as soon as it is possible for the organism to resume its normal functions. Following the administration, an eliminant should be prescribed.

I feel that we should make haste slowly and not indiscriminately recommend any relatively new drug or preparation until we feel that its efficacy justifies such confidence. I believe that I have tested this product sufficiently to give it the stamp of approval. I feel that its discriminate and judicious use will be of benefit to those who are both desirous of and in need of relief from postoperative dental pains.

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#### A CORRECT TECHNIC FOR THE REMOVAL OF DEEPLY IMPACTED MANDIBULAR CANINES\*

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BY LEO WINTER, D.D.S., NEW YORK CITY

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AT a recent dental meeting, ways and means of removing impacted teeth were being discussed. One of the oral surgeons present showed a radiogram of an impacted mandibular canine, the crown of which appeared to extend very nearly to the inferior border of the mandible. The radiogram was a small number one dental film, from which a diagnosis of an impacted tooth could be made but which could not be used for determining its accurate location for an operative procedure. I was asked to outline the technic I would use in its removal. My answer was that I would first take a bite film, by placing a number two dental film between the maxillary and mandibular dental arches,

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\*Republished from May, 1925, at author's request to make illustrations clearer and correct misplaced legends.

with the sensitive side of the film facing downward, and then directing the rays from below upward. The resultant picture would give an accurate localization of the impacted tooth. If the tooth was found to be lying midway between the two layers of bone or toward the buccal, I would make a semi-lunar or semicircular incision midway between the superior and inferior borders on the buccal side of the mandible. The soft tissues should then be



Fig. 1.—Lateral plate of mandible showing deeply impacted mandibular canine.

retracted downward and the overlying bone removed, beginning at the region of the apex. I would continue removing the outer plate following along the outline of the root until two-thirds of the length of the tooth was exposed; then I would place a spear-pointed elevator under it and exert pressure outwards. In other words, instead of exposing the portion of largest diameter first, the apical end would be laid open, and in that manner, the tooth could be removed with a minimum of trauma and very little loss of bone. My reasoning was that the bone around the crown would probably be in a patho-



Fig. 2.—Bite film showing deeply impacted mandibular canine in cross section.



Fig. 3.—Radiogram taken immediately following removal of tooth.

logic condition, exhibiting some decalcification, and that removal of the tooth could be accomplished without chiseling down to the point of its largest diameter. The oral surgeon then informed me that he removed the tooth externally. That is, he made an incision along the lower border of the mandible on the outside of the face, retracted the tissues, and grasped the crown. This procedure, in my opinion, constitutes an unwarranted encroachment upon the tissues of the face. Oral surgery has advanced and has kept pace with the progress of general surgery. One of its chief claims to distinction as a specialty of modern medicine is the development of the intraoral operation. And if operative procedures are adopted which have for their only justification the factor of accessibility, then we are reverting to a type of surgery which may have been pardoned forty or fifty years ago, but which can only bring the modern specialty of oral surgery into disrepute. Regardless of how neatly and skilfully an operation is performed through the external tissues it cannot fail to leave a scar. If it is a line scar it may ultimately disappear. If it becomes infected, however, it will leave a permanent scar. In either case it seems difficult to justify the making of an external incision when the intraoral operation is feasible. The case presented herewith is deeply impacted, yet the tooth was removed by the intraoral method outlined above.

# DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By  
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## ELECTRICAL DANGERS IN X-RAY LABORATORIES\*

BY J. S. SHEARER, B.S., PH.D., ITHACA, NEW YORK

THE recent death of Dr. Jaugeas by electrocution in an x-ray laboratory in Paris has served to direct attention to the danger in the operation of x-ray devices where proper precautions are neglected, or where the idea of safety is based on misconception of the fundamental facts involved. In the July, 1917, number of The American Journal of Roentgenology, I described briefly the sources of danger and pointed out some remedies. It is interesting to note the following review of this article in the Journal de Radiologie et d'Electrologie:

"The author describes what might happen if the patient were subjected to an accidental spark. Without denying the extreme unpleasantness that would result from a short circuit between the patient and one of the high tension wires we may remind the author that confiding the operations in radiology only to a technician of experience, and continuous oversight of the patient and the apparatus, are, in practice, infinitely more efficacious than the automatic methods he prescribes. *Moreover one has never yet recorded, to our knowledge, a fatality due to contact with a high tension circuit used in radiology.*"

The death of Dr. Jaugeas and of several others less widely known, and the serious injury to patients in numerous instances, is sufficient answer to the ideas advanced in this review, especially as Dr. Jaugeas had had many years' experience. As a matter of fact very few roentgenologists have acquired reliable information on this important subject. On this account, and because of the rapid introduction of low power apparatus, it has seemed advisable to extend the remarks of the previous article even at the risk of some repetition.

While it is true that serious accidents in the operation of modern x-ray apparatus have not been numerous, yet the relatively small number of in-

\*Reprinted from the American Journal of Roentgenology.

juries is a matter of good fortune, as opportunities for contact with dangerous conductors have been extremely general.

There is evidently much misunderstanding as to what is or is not dangerous in this connection, resulting in advice often misleading, and, if followed, more likely to increase danger than otherwise. The result of an electric shock will depend in part on the condition of the subject, in part on the current and its duration, and also on the path followed by the current between the areas where current enters and leaves the body. Death is usually regarded as due to action on the heart and respiration, consequently the condition of the heart will be a large factor in the matter. Not only may death be due to an actual lesion, but a fatal result may follow from fright. On this account one is hardly justified in placing a lower limit on the voltage to be regarded as dangerous. Cases are on record where death has been caused by contacts with an alternating power circuit of less than 100 volts. Such cases may be difficult to explain, just as in the case of survival after contact with very high voltages that have not given a fatal result. Yet no one cares to assume that a given individual would not be killed or injured by such shock.

Keeping in mind the possibility of death from comparatively low tension circuits, it is clear that the operation of *any* x-ray tube at the voltage and power needed for fluoroscopic, radiographic or therapeutic work requires an outfit *potentially* dangerous. The only exception would be where the *entire* outfit is surrounded by a grounded metal shield or by a complete insulator. For some work such equipment may eventually be realized, but the present appliances must be used for a long time at least.

Leaving out of account the relatively rare cases where ordinary voltage give a fatal shock, it is generally agreed that a current of 100 ma. *maintained* through the vital organs for a few seconds or less is practically sure to be fatal. There have, no doubt, been numerous instances where a current greater than this has not resulted in death, but at any rate one would not care to risk it.

The current through the body will depend on:

1. The resistance of the body, including the contact resistance where current enters and leaves the skin.
2. The voltage of each instant tending to force current from the point of entry to the point or region where it leaves.

The total resistance of the body may be as low as 5,000 ohms, depending largely on the area of contact, on the dryness of the skin, and on the individual. Thus to originate and maintain a current of 100 ma. we must have 500 or more volts between the points of entry and emergence. Note that any voltage is more dangerous if maintained for more than a brief instant. Although a static machine will give many kilovolts on open circuit it cannot maintain voltage when a few milliamperes are drawn and there would be little chance of serious result to a person in good health from contact with its terminals. Most induction coils in the early days were so designed as to give long spark gap on open circuit, but there was very little maintained voltage on an external resistance as low as that of the human body; thus they were not specially dangerous.

A Leyden jar or other condenser charged to several thousand volts may be discharged through the body causing an unpleasant shock but with little danger, as the voltage not being sustained by a generator there is only a brief rush of current rapidly falling to zero.

It should be noted that a high voltage applied to one point of the body when insulated from all other contacts, thus charging the body to a high potential, is not necessarily dangerous. One can stand on an insulated stool and receive a current charging the body to many thousand volts without danger. But the *maintained* flow of charge through the body is quite a different matter.

In order to understand the reasons for not doing certain things that increase danger, it may be well to consider the fundamental features of an electric circuit.

First, one should note that all electric charge comes from matter being separated from atoms by certain agencies known as generators. The amount thus separated is a very small fraction of the total charge bound up with the atoms of even a limited amount of material. Thus, if all existing generators were set to pumping charge of one sign, say from the earth to some other body, the effect on the electrical condition of the earth would be negligible, much as though all the existing pumps were set to pump out the ocean—the resulting change in sea level would not be noticeable even if no water *ran back*. We therefore consider the earth as in a stationary electric condition. This is expressed by saying that earth *potential* is always zero, exactly as we use sea-levels as a setting point for measuring levels. When an electric charge tends to move to or from the earth the body on which this charge is located is said to be at a *potential* of a certain number of volts. If a point on any conducting system is joined by a conducting path to the earth that point is said to be brought to *zero potential*, or is grounded.

The function of a generator, battery, dynamo, or transformer is to create differences of potential by the separation and movement of charge, thereby causing and maintaining electric current when conditions permit transfer of charge by any outside conducting path.

To illustrate, consider first the *primary* circuit of the usual x-ray transformer. The generator causes a voltage or potential difference of 220 volts between its terminals; a portion of this may be used in the control resistance, the rest is consumed in the primary. This *distribution* is quite independent of the potential of any part of this system as referred to the earth. In fact the entire system may be insulated from earth and given a static charge to thousands of volts and operate just as before.

If now we join any single point to earth, as at Q, that *point* acquires earth or zero potential. Assuming a good conductor between Q and A, the latter point will likewise be at zero potential and P will differ from Q by 140 volts, while B will be 220 volts above or below zero. Grounding a second point, say at P between F and C, will tend to divert current from the primary to the earth, thence to Q. The amount of current so diverted will depend on the resistance over the path PEQ as compared to that of the primary.

Contact between K and B would cause more current through the body than contact at P.

Now if there is no *ground* on the circuit one would get no shock by contact with either Q or P. But if one point, as Q, is "grounded" and one point of the body is "grounded," contact at P will allow current to flow through the body to earth and thence to Q.

The reader should note that these "grounds" may or may not allow any considerable current to pass depending on the resistance of the path PEQ and on the voltage between these points. In the case shown but little current could pass through a human body, as the resistance would be too great for the potential available. Observe that two contacts are needed; both may be direct to the circuit, or may be indirectly made through the earth. So that a "ground" may make it easier to get a shock.

When we deal with much higher voltages the principles remain the same, but it becomes possible to force currents over much greater resistances and one does not need so low a resistance between the active line and the earth to have an effectual "ground."

Fig. 2 shows the electrical features of a transformer circuit where the middle of the secondary is connected to the case or is, for high potential purposes, "grounded" even though no conducting wire runs to "earth." Assuming operation at 60 k.v., i.e., at a little more than a 5-inch gap, the center of the secondary will be substantially at earth potential, each terminal will differ in potential from earth by 30 k.v. Thus if a pointed conductor connected to earth were brought about  $2\frac{1}{2}$  inches from either terminal there would result a discharge to earth. Current passing from C through earth back to B. While one would be quite safe in touching the point B, or a milliammeter connected as shown, there would be grave danger in a simple direct contact with a terminal or even in approaching close enough for a spark from either terminal or the line, although only *half* of the available voltage is involved. The advantage of this construction is that there is never more than *one-half* the working tube voltage tending to cause discharge to the earth or anything connected therewith.

Sometimes in outfits designed to operate on *low* gap one terminal or line of the high tension is grounded. This makes contact by operator or patient with that terminal or line entirely safe; but there is twice as great a risk of spark-over from the other terminal as there is in the case of a grounded middle working at the same gap. One may also connect *one* point on the primary circuit to *one* on the secondary without any increase in danger. When this is done no *low resistance ground* is permissible from either primary or secondary. Serious damage to apparatus has resulted when such a second ground has been made; in fact all ground connections for apparatus protection are best made through suitable resistances.

Consider now a human body between two conductors whose potential difference exceeds a safe limit. If there is an adequate additional resistance or insulator between the body and both or one of these conductors there is no danger. Thus in moderately high tension power work, rubber gloves, insulating mats or platforms, oil switches, etc., are utilized to *insulate* the at-

tendants. If both patient and operator were perfectly insulated from earth there would be no danger from contact with *one* side of a high tension circuit, or if sufficient insulating resistance were placed between them and *one* line they could not be injured by contact with the other side or line. Thus complete insulation of patient and operator from all parts of the high tension lines would be ideal if it could be done without interfering with the work. But no possible system that permits contact with or proximity to a high potential can be made entirely safe.

Assume now, as is usually the case, that the operator concerned is grounded. He must then ensure that no part of his body comes within sparking distance of any part of the high tension line.

In fact there should be a considerable factor of safety, so that the insulation between the body of operator or patient and any point on the high tension circuit ought not to be less than that of an air gap of twice the spark length of a discharge from the high tension line to a pointed conductor connected to the earth.

Thus when using a 9-inch gap on a transformer with a secondary grounded at the middle the shortest distance from the body to the nearest point of the circuit should not be *less* than nine inches. A much greater distance is desirable and except in deep therapy there is no reason why it should not always exceed double the sparking distance to earth.

We now need to consider the danger to the patient more in detail. Were the patient placed on a perfect insulator and *also* prevented from getting dangerously near both lines on opposite sides of the tube at the same time, he would be electrically safe. But when placed on a *grounded conducting table danger is greatly increased*, quite contrary to traditional belief. The path of least resistance from either terminal to earth is from the terminal to the body, thence to the metal table. It makes no difference whether the tubestand is grounded as well as the table or not in so far as danger of electrocution is concerned, since the tube terminals are insulated from the stand in all cases. Also we may call attention to the fact that for high tension work the resistance of the body may be regarded as negligible in comparison with that of a small air gap.

Hence safety of the patient when in contact with any conducting body and between this conductor and any portion of the high tension line is only insured by suitable insulation *between* the line and the patient. Grounding such a conductor, so that discharge from the line to earth would have *least resistance by passing through* the body, increases danger. The use of any metallic table for radiography or treatment where the patient is between the tube and the table should be prohibited. It should, however, be observed that when a horizontal or vertical fluoroscope is used the patient is *not between* the *high tension* and the metal and no danger to the patient arises from grounding.

Keeping in mind the above principles, one may ask: How are they to be applied, or in what particulars are present installations dangerous? One way to answer these questions would be to point out how a laboratory might be arranged so as to reduce the possibilities of danger.

First one must condemn the relegation of x-ray work to cellars, closets

or dark and damp quarters where no one has a right to ask operators or patients to risk their lives in operating high tension apparatus. A considerable number of hospitals are open to just criticism in this respect. Also one must unqualifiedly condemn the crowding of apparatus into inadequate space. The room in which Dr. Jaugeas met his death was reported some months earlier as containing so many odds and ends of apparatus as to make it hardly possible to move about. Rooms to be used for radiography or therapy should be well lighted, dry, well ventilated and not overcrowded.

The present custom in American laboratories of using a large transformer for all work and running high tension lines from one room into another is a continuous menace, as it is always possible for one to attempt to make connections when the line is alive. The practice of having the operating switchboard in a separate room at some distance from the tubestand and often having only a small window for observation is a great risk. There have been several cases of severe shock to roentgenologists or assistants when someone entered the booth or separate room and closed the switch without observing that the other party was adjusting the tube or that the patient had moved to a point of danger. There should be no possibility of closing the switch without standing facing the tube and with a clear, unobstructed view of the entire high tension system. The writer would advise a spring floor switch in series with the timer or operating switch, so that the operator must stand in one position in order to close the circuit, and in case of accident removing the foot would open the circuit irrespective of the timer. This would correspond to the "dead man's" button on electric cars.

Fluoroscopy can now be done with self-rectifying tubes and small transformers, avoiding all risk of having several connections to the same machine, as well as all expensive and complicated overhead systems. In a fluoroscopic room, since operation in darkness is essential, all high tension lines should be so protected as to preclude the possibility of any person, whether familiar with the apparatus or not, coming within ten inches of any part of the high tension circuit. The handles controlling the diaphragm should be of good insulating material and mounted so as to avoid proximity to the high tension line. A red light in shunt with the foot switch and in series with a line switch may serve two purposes: it indicates danger by showing that the main switch is closed, and also serves for weak room illumination when the foot switch is open. If both a horizontal and a vertical fluoroscope are to be operated by a single transformer, changes in connection from one to the other should be made by an oil-immersed switch of proper design. This will eliminate corona and needless exposure of the high tension circuit.

There should be no radiography or therapy using a metal table with the tube above the table, quite irrespective of whether the stand is attached to the table or not. This means the use of a table top of insulating material with ample insulating supports between it and the metal frame or support.

The overhead high tension system should be of tubing (this may be brass instead of copper) firmly mounted in insulating supports. These tubes

should extend to the transformer terminals. No part of the overhead should be less than seven feet from the floor and *only one set of reels should be attached*. No wires or other conductors should be suspended above or below the overhead system, or so that they may swing near to it. *Coolidge filament* wires are part of the high tension circuit and must be treated as such. Reels should be of substantial construction and mounted so as to preclude any possibility of their falling. Any reel permitting a sagging wire should be discarded or repaired at once. The wire on reels is often unsatisfactory, it should be stronger and ought to be inspected frequently.

When treating or radiographing nervous patients, children or those not likely to understand instructions, a sheet of strong canvas should be passed over the patient and fastened to the table, so limiting movement as to prevent the patient from contact with line or tube by raising his arms or legs or by suddenly rising from the table. There is room for improvement in tube holders and terminal connections to assist in this matter. But even if this is done care must still be exercised, especially in deep therapy. The writer questions the advisability of deep therapy at as close a range as 8 inches. The terminals are as close as the target or may even be closer to the body. Further the ratio of deep dose-to-skin dose is much improved by working at greater target skin distance. Special terminals, such as described by Johnson, would help if not too cumbersome. A special screen might be developed if desired.

A quick acting circuit breaker should be inserted in the primary of *every* x-ray transformer. This should be set to act on not more than a 20 per cent overload. Thus if normal operation uses 35 amperes, then 42 amperes should open the breaker. Since on normal operation with a properly designed transformer nearly one milliamperes tube current is secured for one ampere of primary current, it is not difficult to set a breaker for the largest current permitted. A short circuit through the body or otherwise would cause a primary current much above normal, thus opening the breaker.

*Do not depend on line fuses.* It takes time to raise a fuse to the melting point and delay is dangerous. They often stand a high overload for a long period without rupture.

If a double scale milliammeter is used it should be provided with an insulating device for changing the scale.

No complicated apparatus that will allow the terminals of the tube or the lines leading thereto to come near the patient or near to anything in contact with the patient should be permitted.

All switches should be self-opening, requiring the operator to *hold them closed throughout an exposure, or treatment*. This should be done even though a time switch is used. Foot switches should not be constructed so as to lock or stick, but should open quickly and positively on release of pressure. Power switches should open down so that it would not be possible for them to fall shut.

Do not assume that a small outfit is essentially safe. One may be electrocuted by a small transformer if conditions are favorable, and he surely could be no more than killed on a large machine.

The rapidly increasing use of small transformer outfits with self-rectifying tubes for dental and bedside work demands special attention. There is danger from too close proximity to the lead wires, especially where both wires come near the patient or where one is near the patient and the other near metal, as in a metallic chair or metal bed. Also such outfits should never be operated by means of a foot switch. In two instances already reported to the writer an operator has been seriously shocked by some one accidentally stepping on such a switch. Connections of the high tension wires to the tube should be substantial and certain. If one should become detached, unhooked or broken, it may put the patient in series with the tube, causing an unfortunate shock if nothing worse.

It must not be assumed that safety is *insured* by any *system of grounds* or special make of apparatus. In this connection the writer may call attention to the implication in the editorial section of the March issue of The American Journal of Roentgenology that the American type of transformer is more dangerous because the "secondary high tension wires are in direct connection with the primary current through the transformer." As stated above there is *not* usually a direct or metallic connection between primary and secondary, and in any case the construction serves to avoid a potential to ground of more than one-half of that operating the tube—a matter of considerable importance when operating at high gap as in deep therapy.

Ill-advised grounding of electric power circuits may also cause a great deal of trouble and damage. The grounding of ordinary electric appliances such as transformer cases, conduits, panel board boxes, etc., has been worked out on the basis of long experience and is used to reduce risk in case of breakdown of insulation, accidental crossing of high and low tension wires, etc. Also where dampness or unusual conducting conditions are encountered lamp sockets and fixtures of special design are used further to protect the user and reduce fire risk. It is not permitted to ground a point on the active circuit except under very explicit conditions, since a second ground may be very dangerous. It follows that it is not wise to ground in the usual sense the case of an x-ray transformer. When it is done it should be through a suitable noninductive resistance which will carry off surge or "static" without endangering the installation.

Aside from grounding for the real or supposed protection of the patient from discharge likely to endanger life, we have to consider the so-called static that often scares patients and troubles operators, although not essentially dangerous. Whenever a high tension line is operated near insulated conducting bodies, such as metal plates, wires, or the human body when on an insulating support, there will develop electric charges on these surfaces. The amount will depend on the area and proximity of the conductor, on the voltage of the line and somewhat on atmospheric conditions and the dryness of the walls and surfaces. When a person joined through more or less resistance to the earth, as the operator always is, approaches such a conductor, as for example the body of the patient, a brief spark discharge occurs. This is not painful or dangerous but tends to scare the patient and to suggest electrocution, x-ray burn, etc. It rarely occurs in radiography, but may be

troublesome in treatment and fluoroscopy. In the latter it may be avoided by grounding the table if conducting, since the body is not between the tube and a grounded support. If trouble of this kind occurs in treatment it may be overcome by discharging the body through a pointed conductor connected to earth and brought near the body *after the operating switch has been opened*. There is rarely any difficulty of this kind in treatment, however, except where sheets of metal are used for protection and are so placed as to discharge to the skin, and this may be avoided by using felt or rubber between metal and skin.

There is an impression current among many that autotransformer operation is essentially more dangerous than with resistance control. As is often true in other cases, a categorical statement of this kind cannot cover the facts. Keeping in mind that electrocution or serious injury may result from improper use with either control, there are two essential points to consider. When a tube is in operation at a given voltage the danger of spark-over to the patient is the same for both types of control, all conditions being alike. If an actual discharge to the body occurs the autotransformer will maintain a larger current, and in that respect be more dangerous; but the smaller current with the rheostat control may cause death or serious injury. Also when a circuit breaker is used it is likely to open much quicker with autotransformer control than with rheostat, in part, at least, offsetting increased current by decreased duration. Even a moderate series resistance will delay the opening of a breaker somewhat.

In one important particular the rheostat control is much more dangerous than the autotransformer. Suppose a tube taking say 40 ma. at a 5-inch gap suddenly ceases to take current (a cranky gas tube, or a failure in the filament circuit on a Coolidge tube), with a rheostat control *the open circuit* or no current gap on this setting may be 10 or 12 inches, while with the autotransformer the difference between the 40 ma. and the no-current voltage may not exceed an inch. So that the danger of *starting* an arc by tube failure is much greater with the rheostat than with the other control, even though when once started the rheostat may be somewhat less dangerous because of lower current. This is of special importance when using a self-rectifying tube. The voltage of the suppressed wave will be very high on resistance control; hence an autotransformer with a good circuit breaker is much safer with these tubes than is a rheostat.

Neither the precautions here mentioned nor indeed any formulation of rules or regulations can ensure safety to those concerned. But if they are followed they may help to avoid risk, especially to those not familiar with the outfit who may be either patients or assistants. Nothing can relieve the roentgenologist in charge from the duty of knowing that reasonable precautions are taken and that every effort is exerted to secure protection. Neither are hospital authorities free from responsibility. They should not turn over equipment with such possibilities of danger to untrained people or accept advice only from those whose interest is exclusively in sales of apparatus.

Finally, medical colleges may some day come to realize that special training is needed for those who are to utilize such powerful agencies in their profession. It is quite true that there is not time to train all medical practitioners in all topics, but there should be provided opportunity for those who do specialize in radiology to secure adequate training. When this is accomplished this practice should be restricted to medical graduates who have, in *addition* to the regular medical course, such special training as is needed to increase both the usefulness of this agent and the safety of all concerned.

# ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

**Diagnosis of Oral Foci of Infection.** Ler. M. Ennis (Philadelphia). The Dental Cosmos, July, 1925, lxvii, 7.

The author mentions first the routine examination by the general practitioner as being in the same category with urinalysis and blood tests. As in the latter he has recourse to the laboratory, so he should refer patients for mouth examination to a stomatologist. The latter takes a roentgenogram and using this in conjunction with the history and results of clinical examination is able to give the general practitioner a report, not merely on what is present but on just what is to be done in the way of extraction. Two types of teeth may require removal but for different reasons. In pyorrhea it is possible to drain without extraction, the latter being required when the natural mechanical support is so hopelessly forfeited that the teeth are mere foreign bodies. In teeth with apical infection the condition is quite different and the extraction is to put an end to the infectious process which in the absence of proper drainage facilities is a greater menace than the open supuration of pyorrhea. The author lays down three rules for extraction in apical infection: (1) All infected teeth if there is systemic infection. (2) All infected teeth which cannot be treated. (3) Infected upper molars and premolars which are close to the antrum. The interpretation of the roentgenogram must not be left to the roentgenologist but must be made by the stomatologist himself. No special technics are given for the routine tonsillar examination although this would seem to be important; for example, should the tonsil be incised for a latent focus if it seems to be healthy? At the time when the tonsil was believed to be an important port of entry for tuberculous infection such a practice was at least suggested, even if not carried out.

**Ocular Changes in Relation to Dental Sepsis.** H. M. Thompson (Los Angeles). The Dental Cosmos, July, 1925, lxvii, 7.

The author alludes first to the great influence of dental and tonsillar lesions in eye pathology. The quotation from C. H. Mayo to the effect that most of the sickness and death in childhood enters by the mouth can readily be misunderstood in this connection. The lesions in the eye which result from focal infection affect chiefly the uveal tract. An interesting case of

subacute uveitis is given which appeared for months to be due to tuberculosis. The initial reaction to old tuberculin and the improvement which followed therapeutic injections of it seemed to have shown beyond doubt that a tuberculous factor was present. But after the initial improvement had ceased and the patient had become much worse some other causal element had to be sought. The roentgenogram of the teeth was negative. The tonsils were then removed although apparently healthy. Two upper incisors with porcelain crowns were likewise removed on suspicion, and finally an appendectomy was performed in the attempt to save the patient's sight. The patient improved finally and is now able to see well enough to earn her living. The author attributes the benefit to extraction of the teeth, apparently because of the known relation between dental infection and uveal disease. The author tabulates 200 cases of iritis in which there was evidence of syphilis, gonorrhea and tuberculosis in over fifty. There is no mention of rheumatism, malaria or other infection under any name but in eighty-four cases there were dental, tonsillar or sinus infections. In most of the other cases the nature of the supposed infectious element is not mentioned by name but in only three of the 200 was the search for such an element negative in result.

**Extraction of Teeth.** B. S. Gardner (Mayo Foundation). *The Dental Cosmos*, July, 1925, lxvii, 7.

The author takes up especially the question of how many teeth should be extracted at one time, supposing that everything is done in the way of asepsis, minimization of trauma, etc. As a result of the extensive experience of the Foundation and the system of records covering pre- and postoperative conditions a working plan has now been evolved. If block anesthesia can be used it seems to mitigate shock. If the patient have an infection when he presents himself "a dental office is no place for him." He must be given palliative treatment until ready for extraction. As a rule he is put to bed without any emergency extraction, the pus about the teeth being evacuated as in any other situation. Before extraction the patient should have become nearly or quite normal, and by waiting the postoperative troubles ought to be minimized. It is common experience that unless an extraction gives exit to the pus it should not have been performed. That nothing should ever be taken for granted in oral surgery is shown in a case of a young farmer who came to the clinic with an apparent infection of the apex of the mandibular second molar. There was fever so that the patient was at once interned in bed and after hot application a small amount of pus was obtained. Routine examination showed the presence of the ray fungus of actinomycosis. As a rule, if tonsillectomy is necessary the teeth should be extracted first. Sometimes the tonsils at once improve and if there is much reaction from extraction the tonsillectomy should be postponed a week or more. Experience shows that there are cases in which mass extractions are contraindicated. It is better here to extract the easiest to come out at the first stage and follow it up with a second stage later.

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## EDITORIALS

### Ethics and Referred Patients

IN speaking of ethics and referred patients, we have in mind the conditions which arise when a patient, under orthodontic treatment, is referred from one orthodontist to another.

It seems to us that a code of practice could be very easily established which would be fair to the patient and to the orthodontists. When a patient is referred from one orthodontist to another, the orthodontist receiving the patient should try to render such services as are demanded at that particular time. This is especially true, if the patient should be in the hands of the second orthodontist for only a short time, which often occurs during the summer vacation. The man receiving the case should do everything he can for the interest of the patient. If the patient is wearing an appliance which the second man does not use in his practice, he should make the required

adjustments as well as he can and avoid commenting on or criticizing the appliance. Because the first man is using an appliance not used by the second man, this does not imply that the first man cannot get a satisfactory result with the appliance in question. It is not to the best interest of the patient or the science of orthodontia for one man to criticize another man's appliance. This is especially unethical when the patient has been referred to the second orthodontist by the first one and the former will have the patient in his care only a short time.

As a concrete example, we know of an instance where a patient consulted an orthodontist and made satisfactory arrangements for treatment. The patient left the hands of the first orthodontist shortly after the appliance was placed and went to a city in another state for a period of about three months. The patient then returned and was under the care of the first orthodontist for a period of nine months. The first orthodontist had placed a labial appliance upon the teeth and suggested to the patient that during the three months' absence a second man should be seen for adjustments. The second orthodontist being a strong believer in a different type of appliance, condemned the work of the first man, condemned the appliance, took it off and placed on his own appliance. He did this in spite of the fact that he knew the patient would be in his hands less than three months and would return to the first man for a period of treatment extending over nine months. The first orthodontist had a contract with the patient's father in regard to the fee to be paid, which was to include a fee at the beginning of the case and a yearly fee divided in monthly payments. The first orthodontist did not collect his fee for the appliance before the patient visited the second orthodontist. Therefore the father refuses to pay the first orthodontist's fee, using the argument that the second orthodontist removed the appliance and put on another. The unfortunate thing is that the father fails to recognize that the first man rendered service for which he should be paid. You can readily see that an interesting legal tangle has arisen which would be interpreted differently by courts in various states. The situation becomes more embarrassing when we remember that the patient will be forced to go back to the first man during the nine months she is going to school because no other orthodontist is available in that community.

We think the second man made a mistake in interfering with the treatment of the case whatsoever, and removing the appliance, even though it was different from those he was in the habit of using. Orthodontists should be careful in criticizing appliances of others. An appliance that is successful in the hands of one individual may be a radical failure in the hands of another. Also the criticism of an appliance has a decided reaction upon the patient and is a real detriment to the orthodontic profession and also to the public who becomes suspicious of the scientific standing of the profession.

In case a patient leaves the care of one orthodontist permanently and seeks the service of a second man who will have charge of the case until completed, he then may be justified in making an entire change of appliance but in so doing he should tell the patient that Dr. X's appliance is very good but he, Dr. A, can use another appliance much more satisfactorily

owing to his familiarity with it. If Dr. A decides to change the appliance under these conditions and makes an appliance fee for the change that is another matter entirely between Dr. A and the patient.

For one orthodontist to criticize another orthodontist's appliance and recommend its removal and substitution of another is an unethical practice. It is like the surgeon who goes into the hospital and tells the patient that the operation was wrong; he takes the case in hand, removes the stitches and proceeds to do the operation over again. We are willing to admit that the orthodontist does not own his patient and the patient has a right to quit the services of one orthodontist and go to another at any time, but we believe that when the patient is referred from one man to another, the second man should always be considerate of the first, and above all things avoid by word or action anything that will lead the patient to suspect that the first man was not capable of treating the case. It must be remembered that men obtain results by using appliances that differ greatly and each practitioner should, therefore, be given an opportunity to demonstrate that he can get a satisfactory result from the appliance he is using before subjecting him to criticism.

Orthodontists should have an ethical understanding similar to that held in the medical profession which, long ago, has taken the stand against the criticism of methods and treatment of one man compared with those employed by another. If every orthodontist dealing with this situation will try and place himself in the position of the other man, we are sure that such things as we have illustrated will be less frequent.

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### **Everyday Mouth Hygiene\***

In this age of materialism where time is measured in terms of dollars and cents, and illness, aside from the suffering involved, incurs loss of time and expenditure of money, at times without avail, "Prevention" as the basis of the present-day practice of medicine and dentistry, should be regarded by the layman as one of the greatest scientific discoveries. As oral hygiene, however, constitutes one of the underlying principles of this branch of science, care of the mouth must become a daily habit. Of course, for most adults it is quite a difficult task to acquire new habits. Thus, though we may not succeed in teaching them to practice this advice, they at least can help us to preach to their children "Everyday Mouth Hygiene" by reading the little book so entitled and written by Joseph Head, M.D., D.D.S.

The first chapter of this work deals with the results of an ill-cared-for mouth and how to avoid them. By means of very fine cuts, it tends to show how the accumulation of food debris and bacterial plaques causes the formation of pyorrhea and then proceeds to tell of the systemic effects. Then by further illustrative cuts and adequate description, it explains how the toothbrush and silk ligature can remove these masses and thus avoid the serious consequences. Though some of the profession may not endorse Dr. Head's

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\*Every day Mouth Hygiene, by Joseph Head, M.D., D.D.S., Published by W. B. Saunders Company, of Philadelphia and London.

method of brushing the teeth, as the procedure is considered rather difficult for some to carry out, nevertheless, it will help to show the necessity and importance of this daily care of the mouth. For those, alas! who have already had occasion to learn that teeth will prove false to us unless we are true to them, there are instructions for cleansing removable artificial dentures. The last chapter deals with irregularities of children's teeth. This book is especially commendable because it shows, in a very simple way, the relationship between temporary and permanent teeth, the necessity for their care, how they are developed and their effects on facial and physical development; it also gives some idea as to the normal bite of a child.

After reading this clear, concise, and instructive work, we cannot help but recognize it as another aid for achieving our goal "Prevention." Not until mouth hygiene and proper diet become habits of daily routine for each one of us can we hope for nation-wide prevention of aches and pains and world-wide prohibition of disease, for individually self-imposed prohibition is the only kind that can count.

—M. G.

## ORTHODONTIC NEWS AND NOTES

### Meeting of the Organization Committee of the First International Orthodontic Congress

A meeting of the Organization Committee of the First International Orthodontic Congress was held at Atlanta, Ga., April 15, 1925. The following officers were elected: President-General, William C. Fisher, 501 Fifth Avenue, New York, N. Y.; Secretary-General, Walter H. Ellis, 397 Delaware Avenue, Buffalo, N. Y.; Treasurer-General, E. Santley Butler, 576 Fifth Avenue, New York, N. Y.

The following societies have become members of the Congress: American Society of Orthodontists, New York Society of Orthodontists, Rocky Mountain Society of Orthodontists, Southern Society of Orthodontists, Southwestern Society of Orthodontists, Eastern Association of Graduates of the Angle School of Orthodontia, Alumni Society of the International School of Orthodontia, Alumni Society of the Dewey School of Orthodontia, European Orthodontological Society, British Society for the Study of Orthodontics, Société Française d'Orthopédie Sento-Faciale, Deutsche Gesellschaft für Zahnärztliche Orthopädie.

Each society is allowed the privilege of electing a member to the Board of Governors. The following men have been elected:

President-General, William C. Fisher,  
Secretary-General, Walter H. Ellis,  
Treasurer-General, E. Santley Butler,

#### BOARD OF GOVERNORS

Frank M. Casto, Cleveland, Ohio, (A.S.O.).	T. W. Sorrels, Oklahoma City, Okla., (A.S.I.-S.O.).
Jos. D. Eby, New York, N. Y. (N.Y.S.O.).	
F. W. Beesley, Denver, Colo., (R.M.S.O.).	Martin Dewey, New York, N. Y., (A.S.D.-S.O.).
George W. Crozat, New Orleans, La., (S.S.O.).	
Paul G. Spencer, Waco, Texas, (Sw.S.O.).	A. C. Lockett, London, Eng., (E.O.S.)
C. A. Hawley, Washington, D. C., (E.A.G.A.-S.O.).	Harold Chapman, London, Eng., (B.S.S.O.)
	James T. Quintero, Lyon, France, (S.F.O.-S.F.).

The following committees have been selected and appointed by the president as provided for under the plan of the organization:

#### PROGRAM COMMITTEE

C. A. Hawley, Chairman, 1624 Eye St., N.W., Washington, D. C.	H. C. Pollock, St. Louis, Mo.
Oren A. Oliver, Nashville, Tenn.	William E. Flesher, Oklahoma City, Okla.
	Jos. D. Eby, Secretary, New York.

## COMMITTEE ON ARRANGEMENTS AND EXHIBITS

Chas. A. Spahn, Chairman, 121 East 60th St., Oscar Carrabine, New York, N. Y.  
N. Y. C.

## COMMITTEE ON REGISTRATION

George B. Palmer, Chairman, 40 East 41st St., N. Y. C.

## PUBLICITY COMMITTEE

Martin Dewey, Chairman, 501 Fifth Avenue, N. Y. C.

## RECEPTION COMMITTEE

L. M. Waugh, Chairman, 576 Fifth Avenue, Frank Nicolai, Brooklyn, N. Y.  
N. Y. C.

## BANQUET COMMITTEE

Wilber L. Dailey, Chairman, 19 East 69th St., N. Y. C.

## TRANSPORTATION COMMITTEE

John W. Ross, Chairman, Philadelphia, Pa., (East)	Chas. R. Baker, Evanston, Ill., (Central West)
Harle L. Parks, Atlanta, Ga., (South)	T. G. Duckworth, San Antonio, Texas (South West)
B. Frank Gray, San Francisco, Calif., (Paci- fic Coast)	A. C. Lockett, London England, (Europe)

## GOLF COMMITTEE

Jos. D. Eby, Chairman 121 East 60th St., N. Y. C.	Frank M. Casto, Cleveland, Ohio, Harry A. Hosmer, Detroit, Mich.
Paul G. Spencer, Waco, Texas	

## LADIES ENTERTAINMENT COMMITTEE

Oscar Carrabine, Chairman, 542 Fifth Avenue, N. Y. C.

**Meeting of the British Society for the Study of Orthodontics\***

A special meeting of the British Society for the Study of Orthodontics was held on June 16, when Dr. Mershon, of Philadelphia, read a paper on "A Practical Talk on Why the Lingual Arch Is Applicable to the Orthodontic Problem." There was a large audience, the members of which were well rewarded for their attendance by hearing a most illuminating address. Although the title of the paper might have suggested a discussion on the technical methods used for moving teeth, actually the paper was a broad presentation of the general principles of orthodontics as a problem in bone growth. It was very instructive to hear at first hand those newer principles which are coming to dominate this subject, given by one who, in conjunction with Hellman and Leroy Johnson, has had so considerable a share in bringing about what might, without exaggeration, be termed a revolution in orthodontic principles. Dr. Mershon took his hearers into his confidence and gave them what might be called a confession of his faith rather than a formal paper. The result was an address which was characterized by a singular candor and modesty. In welcome contrast to those who have treated orthodontics as being almost entirely the technical development of mechanical methods car-

Reprinted from the British Dental Journal, July 1, 1925.

ried to a high degree of refinement, Dr. Mershon pointed out that our treatment should be restricted as much as possible. It should be cautious and tentative, for our knowledge is so incomplete that it does not warrant a hasty application of powerful appliances. The orthodontist should regard himself as holding a watching brief. His interventions should be performed almost reluctantly, and with the idea of aiding the natural forces of growth rather than forcibly to move teeth in this or that direction. One point of great interest was Dr. Mershon's statement that he had abandoned retention, as commonly understood. Another point was that appliances were frequently removed during the course of treatment so as to allow a period of rest to the tissues. He said that so far from getting relapses, the general results were much better. There was an excellent discussion, which showed that Dr. Mershon's audience was fully appreciative of the suggestiveness of his paper. It is worthy of mention that Dr. Mershon is in this country on a holiday, and that the preparation which this paper entailed was a generous sacrifice of a part of his leisure. An interesting announcement which Dr. Mershon made was that a school of study in Orthodontics has been established at Pennsylvania Dental School under Leroy Johnson, which will differ from the quasi-private orthodontic schools in America in being devoted to the biologic and physiologic principles of the subject rather than to details of technique. It makes us envious that such opportunities for orthodontic training should exist in America and not in this country.

#### **The Forsyth Dental Infirmary for Children\***

The tenth report of the Forsyth Dental Infirmary for Children, which has come into our hands, shows that the work of this beneficent institution still increases. Prior to its institution there was no place in the city of Boston where young children could receive dental treatment. Since its commencement 150,000 children have received treatment. Among the many interesting features of the Forsyth Infirmary is the dental pediatric clinic. The Director, Dr. Harold Cross, defines this as a medical clinic with a dental viewpoint. Its object is to improve the nutrition with a view to influencing the structure and quality of the teeth. It has come into existence as the result of research work which tends to show that the development and maintenance of the teeth depend largely on nutritional factors. This clinic has only been in existence two years, but in time it should be able to provide valuable data concerning the possibility of influencing the structure of the teeth and their resistance to disease by systemic treatment. Orthodontics is represented by the Dental Orthopaedic Clinic. This deals only with children under five and one-half years of age, whose jaws have not developed as rapidly as they should have done. The treatment given is a simple expansion of the dental arches with a view to provide sufficient room for the permanent teeth, and so prevent irregularities. The treatment is thus preventive rather than remedial. It will be of great interest to see whether these aims are accomplished, and whether treatment of this type, at this age, actually does prevent malocclu-

\*Reprinted from the British Dental Journal, July 1, 1925.

sion in later life. So far, the number of cases under treatment is small, only eight for the year. Nothing is said as to whether the older children attending the infirmary receive any treatment for the malocclusion which must undoubtedly exist in a considerable number of cases. Unless they receive treatment outside it would appear that actual irregularities existing in the permanent dentition go untreated. If this is so it might be pertinent to suggest that the very complete prophylactic and remedial treatment of dental disease which is carried out as a routine on every child must be diminished in its permanent value if gross cases of malocclusion do not receive any treatment. The number of "first grade" children, that is, children under six years, who attend for treatment, continues to grow. The director remarks that the importance of this early treatment is shown by the fact that often as many as ten fillings per child are necessary. The benefits of this early treatment are seen in the dental condition of the children who enter the high schools. There is a dental hygienists' school attached to the infirmary where girls receive a course of instruction lasting eight months. A diploma is given after examination by the Trustees of the Infirmary. This school was founded in 1916, and since then 324 graduates in dental hygiene have been trained there.

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#### **The Dental Society of the State of New York**

The Dental Society of the State of New York will hold the fifty-eighth annual meeting at the Hotel Astor, New York City, May 19, 20, 21 and 22, 1926. All literary exercises, clinics and exhibits will be staged at the Hotel Astor.

The society extends a cordial welcome to all ethical dentists.

Exhibitors are requested to address Dr. H. C. Bennett, Chairman of the Exhibits Committee, 576 Fifth Avenue, New York City, for information and space.

Educational courses will be conducted on Monday, Tuesday and Wednesday, May 17, 18 and 19. Address Dr. Edward Kennedy, Chairman of the Educational Courses, 347 Fifth Avenue, New York City, for information and enrollment.

Make reservations early at the Hotel Astor.

A. P. Burkhart (Secretary),  
57 East Genesee Street,  
Auburn, N. Y.

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#### **Dental Health Talks Sponsored by the Public Service Committee of the Chicago Dental Society**

The Chicago Dental Society's Public Service Committee is planning a campaign of Dental Health Education, and for that purpose is training a class of twenty-five speakers. In order to secure material for the use of these speakers three hundred and fifty dollars will be given in prizes. Seven prizes of fifty dollars each for the best twenty minute speech suitable for presentation to the following type of audience:

Grammar School Children.  
High School Children.  
Parent Teachers Audience.  
Kiwanis Rotary Club Audience.  
Church Audience.  
Factory Talk, Employees Audience.  
Radio Talks.

Points to be considered:

Simplicity of English.  
Facts.  
Suitability for specific audience.

Any contributor is eligible to write on any or all subjects. Write on one side of paper only. Place manuscript in envelope with separate note giving name and address of sender. Writers agree that all material may be used by committee. All material should be in by October 1, 1925.

Address all mail to: Dr. F. B. Rhobotham, Room 1406, Field Annex Building, Chicago.—Herbert E. Phillips, Chairman, Sub-Committee on the Lay Education of the Public Service Committee of the Chicago Dental Society.

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### **A Meeting to Make Better Dentistry Practical**

It is difficult for most dentists to apply much of the best scientific information as it is generally presented in meetings. They and their patients are serious losers.

The first District Dental Society proposes to devote its December meeting to the application of science to practice. There will be no finely spun theories and no effort to develop new knowledge. We are going to find out how to use at the chair what we think we already know.

### **If This Interests You Plan to Come!**

All sessions and clinics at Hotel Pennsylvania, December 2, 3, 4, 1925. Write now for reservations.

For further information address: E. M. Davies, Gen'l Secretary, 250 West 57th Street, New York, N. Y. First District Dental Society of the State of New York.

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### **New York Society of Orthodontists**

At the next regular meeting of the New York Society of Orthodontists, to be held the fourth Wednesday, October the twenty-eighth, beginning promptly at two o'clock at the Vanderbilt Hotel, New York City, the following program will be presented.

Dr. Oren Oliver of Nashville, Tennessee, will demonstrate the technic of the construction of labial and lingual, upper and lower appliances, in not less than three practical cases.

Recess—at the pleasure of the president.

Dr. Oren Oliver, clinic presenting several cases of actual appliances used, and the presentation of the cases showing the permanent results attained.

Dr. William Flesher, Oklahoma City, Oklahoma, will report the results obtained during the last three years with the use of the above type of appliances.

Manufacturer's exhibit of orthodontic materials, to whom invitations have been extended, to be present at Dr. Oliver's clinic in order that they may co-operate in the manufacture of our metallurgical requirements.

Dinner served at 6:30.

Evening session at 8 o'clock. Dr. Wm. K. Gregory, Paleontologist to the American Museum of Natural History and Honorary Member of this Society, will deliver a lecture illustrated by motion picture entitled "Wanderings in the Atlantic and Pacific with Beebe on the *Arturus*."—C. A. Spahn, Secretary-Treasurer, 121 E. 60th Street, New York, N. Y.

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### **American Board of Otolaryngology**

The next examination given by the American Board of Otolaryngology will be held at the Cook County Hospital, Chicago, on October 19th, 1925. Application should be made to the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

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### **News and Notes**

Dr. Roscoe A. Day announces the removal of his San Francisco office to 1105 Medico-Dental Building, Post at Mason Street, San Francisco.

Dr. William E. Flesher announces the removal of his offices to Suite 806 Medical Arts Building, Oklahoma City, Okla. Practice limited to orthodontia.

Dr. T. Wallace Sorrels announces that after September the tenth Dr. Harry H. Sorrels will be associated with him in the exclusive practice of orthodontia. Suite 906 Medical Arts Bldg., Oklahoma City, Okla.

Dr. A. LeRoy Johnson announces the removal of his office from 1530 Locust Street to Physicians Building, corner of Twentieth and Chestnut Streets, Philadelphia, Pa.

Dr. A. J. Labbe announces the removal of his office after July 10, 1925, to Suite 412 American State Savings Bank Building, Lansing, Michigan. Practice limited to orthodontia.

Dr. Raymond L. Webster announces the opening of an office at 130 Touro Street, Newport, R. I., for the summer months in connection with his Providence office. Practice limited to orthodontia.

Dr. Victor Lay announces the opening of his office in the new Medical Arts Building, 40 West North St., Buffalo, N. Y. Practice limited to orthodontia.

Dr. Howard A. Weis announces that he has moved his offices from 503 Security Bldg., to 203 Central Office Bldg., West 3rd Street, Davenport, Iowa.